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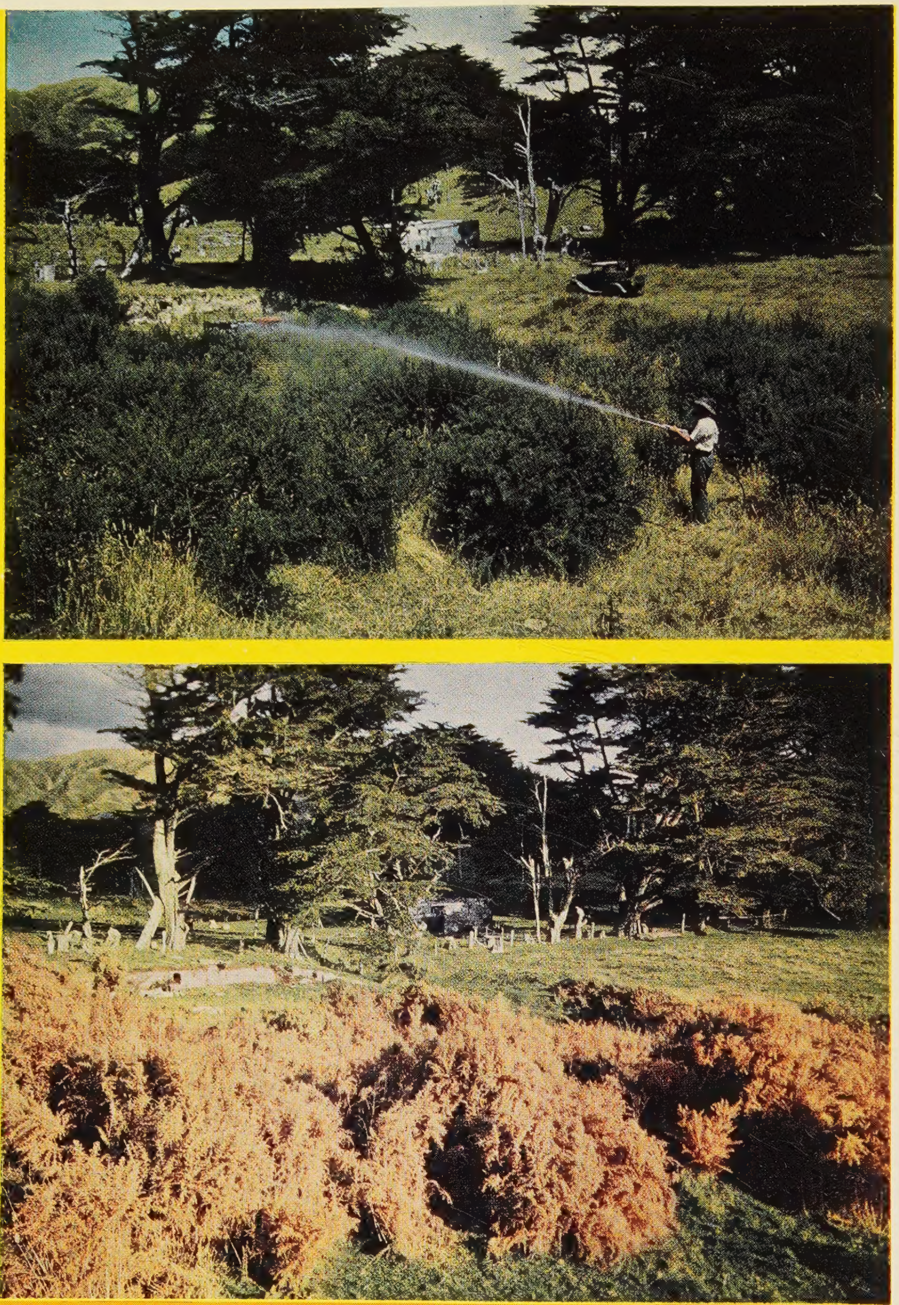

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NEW ZEALAND
Journal of Agriculture

Vol. 102 No. 1 16 January 1961

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Cultivating maize grown for seed at Cape Runaway on the east coast of the North Island. The warm climate of this district and its abundant rainfall favour the growing of maize, kumaras, potatoes, and other crops. Maori landholders, who predominate, are able to produce a large proportion of their domestic requirements.

[*Robin Smith*

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U. S. Secretary of Agriculture in N. Z.

DURING a three-and-a-half day visit to New Zealand in November Mr Ezra Taft Benson, United States Secretary of Agriculture in President Eisenhower's Cabinet, fitted brief calls at Ruakura Animal Research Station and Massey Agricultural College into what was necessarily a whirlwind tour culminating in discussions in Wellington with the Prime Minister, Mr Nash, the Minister of Agriculture, Mr Skinner, other members of the New Zealand Cabinet, and departmental officials.

Mr and Mrs Benson being met at Ruakura Animal Research Station by the Director, Dr C. P. McMeekan.

MR BENSON was accompanied by Mrs Benson, two of their daughters, a son-in-law, four United States Department of Agriculture officers, and five representatives of United States agricultural press, radio, and television media.

In press and radio interviews and in his official discussions Mr Benson emphasised his desire to promote liberalisation of trade between the United States and New Zealand. He foresaw possibilities for increasing sales of New Zealand lamb in the United States and underlined United States interest in New Zealand wool by spending an officially unscheduled hour or so at the first Wellington wool sale of the season, where he and accompanying officers saw disposals from a full catalogue to a full and keenly competitive bench of buyers.

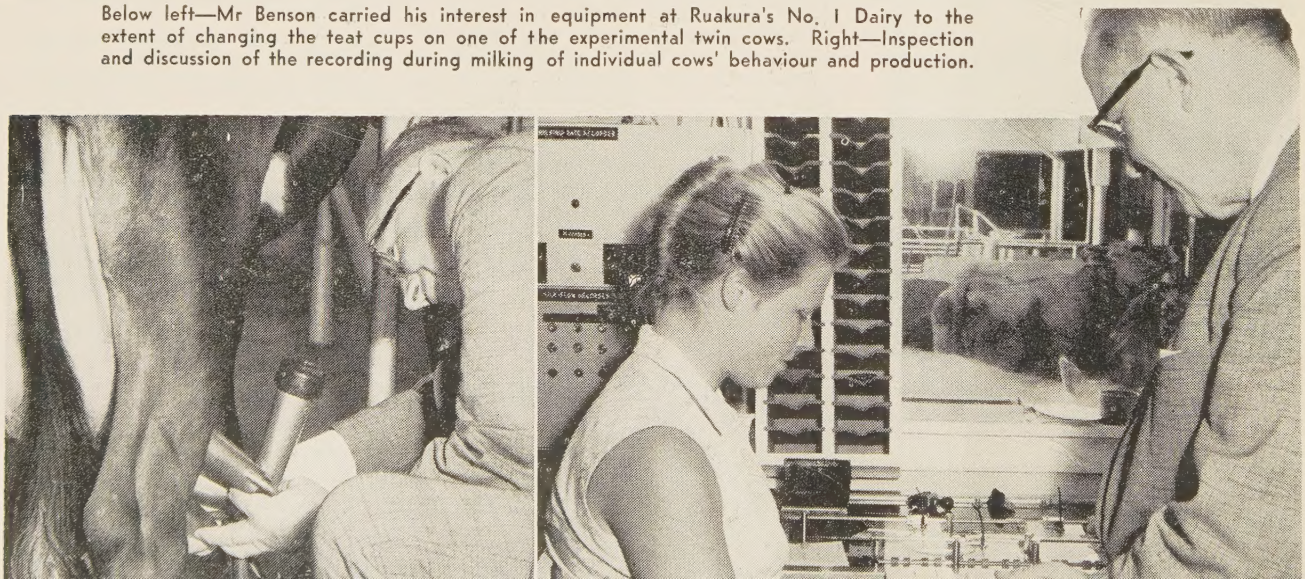
A county agent (the equivalent of our farm advisory officer) in his early career, Mr Benson impressed with his wide practical knowledge of agriculture.

Stories he had heard from farm neighbours in southern Idaho, where he was born and reared, and from his wife, whose father had visited New Zealand 100 years ago, had made him want, as far back as he could remember, to come to this country, Mr Benson told a State luncheon in his honour. "Now that I have had that privilege, have met your leaders, have seen your dairy and sheep industries, and visited your farmers, I can say that you have no need anywhere to apologise for your agriculture. I have yet to meet a country that has the calorific intake of New Zealand. . . . It is probably the best fed nation in the world.

"I can take home some suggestions for American farmers and for our people. We could, for instance, increase our consumption of butter until we have to import from New Zealand.

"I hope that through increased trade, agricultural and otherwise, our bonds of friendship will in time be strengthened with this, one of the choicest lands in all the world; and in the last eight years I have visited 40."

Below left—Mr Benson carried his interest in equipment at Ruakura's No. 1 Dairy to the extent of changing the teat cups on one of the experimental twin cows. Right—Inspection and discussion of the recording during milking of individual cows' behaviour and production.



Grassland Association Conference in Southland

- A suggestion that if the way were open for more people to have a direct financial interest in New Zealand farming there would be a much clearer appreciation of the proper role of farming as the natural basis of the whole national economy. . . .
- Criticism of a not unnatural tendency for parents to retain control of farm properties well beyond their allotted span, while their kith and kin long for a greater measure of responsibility and ownership; and for some estates to be run with indifferent results while the younger generation is denied incentive to increase production. . . .
- And a claim that there appeared to be wide scope for expanded production of cash crops, including sugar beet, in Southland without reducing stock numbers. . . .

These were some of the provocative contributions that made the 22nd annual conference of the New Zealand Grassland Association in Invercargill in November an outstanding one for the extent to which papers and discussion ranged over the broader aspects of grassland farming.

CONFERENCE papers provided data on the rapid development of the grassland resources of this "booming" province, particularly since the 12th conference was held there in 1950.

Three properties visited during the field day illustrated stages of transition in an area where, though much has been accomplished by the application of science and new development techniques to farm improvement and management, there is still great scope for the pioneering of undeveloped and problem areas.

Role of Association

The Grassland Association could be wasting its time in striving for better materials and techniques in grassland farming if it did not at the same time work for economic conditions favourable to profitable application of the improvements it might bring about, said Dr P. D. Sears in his presidential address in which he propounded the need for greater public investment in the business of farming.

"Grassland farming in New Zealand is operating in a changing environment and one not necessarily conducive to its proper development," he said.

"Other countries are rapidly overtaking the technical advances we have made in farming, leaving us in the position that we must seek even more urgently for improvements in our methods.

"The benefit of much of our technical knowledge is being lost through insufficiency of our extension services. To ensure full benefit from such advances as we are able to make, we must make it possible for new knowledge to be rapidly applied on farms.

"We must see that New Zealand does not overlook its natural advantages in grassland farming in chasing too vigorously after urban industrial variety.

"Much of this development," said Dr Sears, "is due to the fact that New Zealanders with capital to invest in company shares can at present turn only to trading and manufacturing companies. This has the effect that the flow of capital and the advantages of large-scale company management are tending to be a monopoly of urban industry.

"As an association we should be studying whether some of these advantages could be diverted to our grassland farming," he said.

"There are just not enough people actively financially interested in New Zealand agriculture. Because of this the present rapid development of other industries is inevitable, due to the lack of financial facilities for widespread investment in agriculture.

"In other words, our obvious trend toward smaller single ownership units and the lack of joint stock companies in New Zealand agriculture must mean a continuing swing away from grassland farming as our basic activity.

"Unless the new industries, which are backed by widespread ownership and employment, have a good international economic advantage, then our standards of living must suffer," said Dr Sears.

Quoting figures to support his claim that only about one-fifth of New Zealand's population was financially interested in agriculture, and that only a little over half of these were directly sharing the risks and the profits of grassland farming, Dr Sears continued:

"We have the paradoxical situation that the advantages of large-scale company management are largely limited to urban industries, while farmers not only do not seek these advantages for their own industry, but actually, in some cases, contribute capital for the development of secondary industries which in the end could seriously jeopardise the natural role of farming in New Zealand's economy. It is a situation which I think well merits the attention of some economic bureau," he said.

"If in fact economic agriculture can be practised in other countries by large-scale companies with well paid, well organised, large staffs, I see no reason why such should not be added to our present good farming."

Land Development in Southland

A protagonist for private enterprise in land development in Southland was Mr G. J. Watt, Commissioner of Crown Lands at Invercargill, who said that the best contribution to increased production in the province should emanate from the family hearth, though he deplored the tendency for youth to be denied too long a hand in management of family properties.

A recent survey of the Young Farmers' Club movement in Southland, with a membership of 1,000, showed that more than 60 per cent would have insufficient finance to attain their life's ambition of owning a farm, and of these 40 per cent desire settlement in the next five years.

It had been demonstrated again and again that private enterprise could make a major contribution to increased production and land development, said Mr Watt. As an illustration he quoted the performance of the Mt. Linton Station, where since 1945 about 8,000 acres had been brought in and several thousand acres topdressed and oversown. Stock that in 1945 numbered only 11,000 sheep and 350 cattle had been increased to 32,000 sheep and 2,500 cattle today, and the wool clip had increased five-fold.

Surveying the development potential of Southland in the period 1960-80, under the classifications of undeveloped land (150,000 acres), partially developed (644,500 acres), pastoral (1,405,500 acres), and developed

GRASSLAND FIELD DAY in SOUTHLAND

Top—The conference chairman, Dr P. D. Sears, sums up discussion on the farm of Mr S. C. Bowmar, Waimumu. Of 491 acres the property carries 1,650 ewes and 30 to 40 cattle.

Middle, from left—Mr G. Fougere describing the development and management of his 279-acre farm at Springhills that carries 1,150 ewes, 250 hoggets, and 20 cattle; Mr S. C. Bowmar; Mr W. Faithful, Instructor in Agriculture of the Department of Agriculture, Invercargill, and Dr Sears discuss the field day programme.

Bottom left—Mr E. J. B. Cutler maintains his enthusiasm for Southland soils in the face of a squall of rain during the field day.

Bottom—On the 234-acre mixed farm of A. Hillis and Son, Edendale, which carries 35 Friesian dairy cows and replacements, 1,100 ewes, and a few beef cattle.

(1,500,000 acres), Mr Watt forecast sheep numbers to increase from 5.75 million to 8.45 million; run cattle from 109,000 to 170,000; wool sales from 185,000 bales to 276,000; sheep killings from 4 million to 6.17 million; and prime beef killings from 23,000 to 38,000. Total farm income figures were expected to increase from £21 million to £31.3 million.

"This sustained and substantial increase in production can be achieved only through the combined efforts of State and private enterprise, with the greater contribution coming from the latter. Government land development should be concentrated where most capital is needed and where returns may be slower," said Mr Watt.

Mr A. C. Hurst, North Otago farmer, irrigation pioneer, and stimulating and provocative personality at many conferences, who was elected an honorary life member at the Grassland Association's annual meeting.

The contribution of the Department of Lands and Survey to Southland development was growing. Land held by the Department in the province in 1960 totalled 165,500 acres, of which 100,000 acres was arable and was expected to subdivide into 186 units.

Marginal Lands Board assistance had also opened the gateway to increased production and in the realisation of the yet untapped potential of Southland such assistance must find an ever-increasing place. Speaking at one of the properties visited during the field day that had been developed with the Board's help, Mr Watt said, "The pioneering spirit is very much alive in Southland, and if the Marginal Lands Board can drop a match here and there it is very glad to do so."

Fuller Use of Soils

"Now is the time to broaden the scope of agriculture and to investigate new crops and industries based on the full use of soil resources," said Mr E. J. B. Cutler, pedologist of the Soil Bureau of the Department of Scientific and Industrial Research, Dunedin, in summarising his paper on the potential uses of Southland soils. On the 1,049,000 acres of mixed farming soils of Southland intensive grassland would still be the basic use, but cash cropping would play an increasingly important role.

Papers and Speakers

Presidential Address: P. D. Sears, Department of Scientific and Industrial Research, Palmerston North.

"The Soils of Southland and their Potential Uses": E. J. B. Cutler, Department of Scientific and Industrial Research, Dunedin.

"Farming Problems of Southland and Progress Made during Recent Years": W. Faithful, Department of Agriculture, Invercargill.

"Land Development Possibilities in Southland": G. J. Watt, Department of Lands and Survey, Invercargill.

"Some Aspects of Pasture Production and Utilisation in Southland": A. J. Harris, Department of Scientific and Industrial Research, Gore.

"Methods of Cutting Pasture for Silage": H. G. Hopewell, Department of Agriculture, Hamilton.

"Trends in Pasture Conservation": J. R. Murray, Department of Agriculture, Hamilton.

"Trace Elements in Relation to Animal Health in Southland": E. D. Andrews, Department of Agriculture, Wellington.

"Improvement of Tussock Grasslands of Southland": W. O. Sly, Department of Agriculture, Invercargill.

"Improvement of Low Altitude Tussock Country in Central Otago": T. E. Ludecke, Department of Agriculture, Alexandra.

"Sheep's Feet and Pasture Plants": D. B. Edmond, Department of Scientific and Industrial Research, Palmerston North.

"Lucerne-Grass Mixtures": N. A. Cullen, Department of Agriculture, Dunedin.

Reports by delegates to the 8th International Grassland Congress in Britain in 1960.

"Proceedings" of the conference, including discussion of papers, will be supplied free to financial members. Orders at 15s. per copy will be accepted by the secretary to the Association, Box 2298, Wellington, up to the time of going to press.

"The population of New Zealand is rising fairly rapidly and the demand for food crops is likely to double in the next 40 years," he said. "However, we are still importing some food crops, particularly wheat and cereal crops (including spirits), and all our sugar. Most of the several million pounds spent on importing these crops each year could be saved if we used our soil resources more fully. Many soils in Southland are suitable for growing rye, and from rye we can make whisky. The climate is suitable, and the time is now ripe for investigation of this industry."

Where these soils had been intensively developed there were good tilth, good drainage, and high fertility, and they should be used for intensive mixed farming rather than for fat stock only. They should be well suited for crops such as potatoes, sugar beet (for sugar), rye (for whisky and spirit), and to a less extent for oats and wheat. The demand for market garden crops would increase rapidly; root crops grew very well on many Southland soils; and the province could grow an increasing proportion of New Zealand's potato crop as the population rose.

"The sugar beet industry," said Mr Cutler, "is one which should be well adapted to Southland. Sugar beet grows well here and there are adequate areas of suitable soils close to sites suitable for processing factories. The tops and the trash after extraction of sugar are suitable for stock fodder. Freezing works' steam-raising equipment could be used in winter for extracting raw sugar. There may be reasons why a sugar industry could not be economic, but some serious investigations seem necessary."

Aesthetic and Recreational Values

The growing need as population increased and land development spread to look at the aesthetic and recreational value of the landscape was referred to by Mr Cutler. "It is no doubt economic," he said, "to straighten rivers and dig large open drains across the land, but what will be the long-term effect of this on the fishing and wildfowl resources? Is it necessary to drain every swamp and destroy all the breeding sites for wildfowl? Is it not time to consider ways and means of increasing rather than depleting the wild life resources? Now is the time to plan for the recreational needs of the community for the future. The productivity of Southland is surely high enough to allow areas of our soil resources to be set aside now for recreation and sport. . . . There is also great need to reserve a few sites of native vegetation and soils for scientific purposes."

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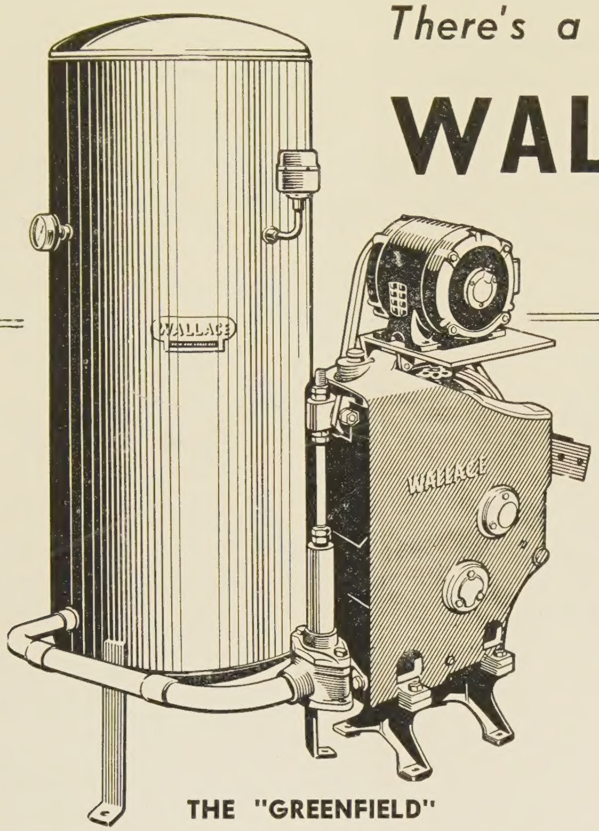

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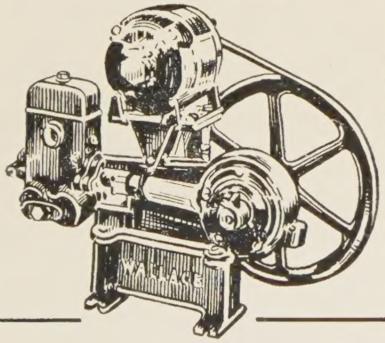

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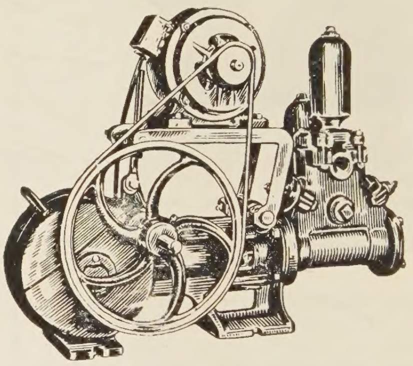

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Mr J. W. Woodcock, president-elect, who will chair the Association's 1961 conference at Tauranga.

Officers

THE following officers were elected at the annual general meeting of the New Zealand Grassland Association: President, Mr J. W. Woodcock, Director, Farm Advisory Division, Department of Agriculture, Wellington; immediate past president, Dr P. D. Sears, Director, Grasslands Division, Department of Scientific and Industrial Research, Palmerston North; vice-president, Mr I. L. Elliott, Superintendent, Rukuhia Soil Research Station, Hamilton; committee members, Mr J. E. Bell, Fields Superintendent, Department of Agriculture, Auckland, Mr A. V. Allo, Farm Advisory Officer, Department of Agriculture, Tauranga, Mr G. Yeoman, farmer, Whakatane, Mr H. Woodyear-Smith, N.Z. Farmers' Fertiliser Co., Auckland; secretary, Mrs H. Foster, Department of Agriculture, Wellington.

Next Conference

The annual meeting recommended to the incoming executive committee that the conference in 1961 be held in Tauranga.

Mr I. L. Elliott, elected vice-president of the Association.

Best Use of Peats?

Inclusion of the large peat bogs of the Seaward Moss district of Southland in Mr Cutler's classification of land unsuited to agriculture provoked a question from Mr I. L. Elliott, Superintendent of the Rukuhia Soil Research Station, where much research has been done into the development of Waikato peats, whether Mr Cutler considered there was no future for peat swamps. Mr Cutler replied that he thought the Seaward Moss should be left alone at present, as it was difficult to drain and manage and there were a million acres of tussock land in Southland more suitable for development. The peat swamps might have an industrial use, as in Ireland, where sphagnum peats were milled, bagged, and sold, mostly to the United States, for horticultural use and for fuel.

Study of peat development overseas was the subject of Mr Elliott's later report to the conference on his visit to the Grassland Congress in Britain. Then and on a previous trip in the Northern Hemisphere he had investigated the utilisation of peat soils and on both occasions had returned filled with enthusiasm for the potential that peat soils in New Zealand might be made to display.

"I am convinced, however, that the real future of many of these areas is not for pastures but for horticultural and agricultural crop production," he said. "My great concern at the moment is that what we are doing to our swamps now will not preclude their effective use for crops some time in the future. Peat soils are prized above all others in other parts of the world for the production of horticultural crops, and I would rather see ours left alone than developed in the way some of them have been in the past. There are areas of New Zealand where peat soils can be used as they are in other countries.

Professor L. W. McCaskill Appointed Director of Tussock Grasslands and Mountain Lands Institute

THE appointment of Professor L. W. McCaskill, at present associate Professor and Head of the Department of Rural Education at Canterbury Agricultural College, Lincoln, as first Director of the Tussock Grasslands and Mountain Lands Institute was announced recently.

The Institute will investigate management of the tussock grasslands and mountain lands, develop techniques to bring about a more protective and stabilising cover of vegetation, and provide a centre for the co-ordination, dissemination, and fostering of research.

Represented on the Institute are the Soil Conservation and Rivers Control Council, the Departments of Agriculture, Lands and Survey, and Scientific and Industrial Research, the Forest Service, Canterbury Agricultural College, Federated Farmers, the Meat Producers Board, and the Wool Board.

The Institute will be established at Lincoln and will be financed by grants from the Meat Producers and Wool Boards and the Soil Conservation and Rivers Control Council.

Professor L. W. McCaskill.

Uniform System of Age Marking of Sheep

Age Marking of Sheep Legally Recognised

With the passing of the 1956 Amendment to the Stock Act age marking of sheep became legally recognised, provided special regulation-sized pliers with a maximum cut of $\frac{3}{8}$ in. in depth and $\frac{1}{8}$ in. in width were used.

How old ARE these 5 year olds ?

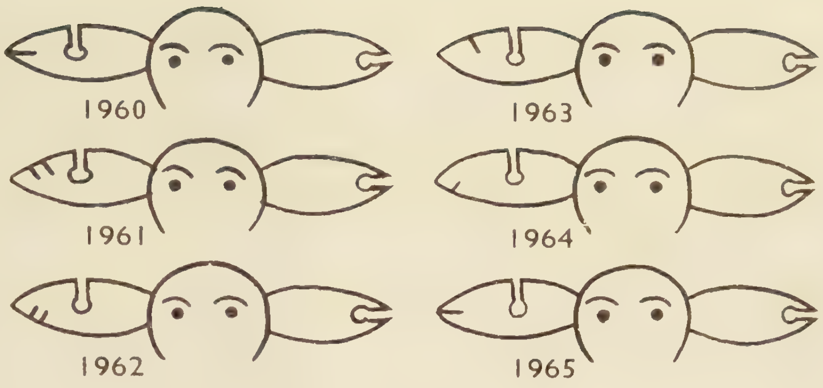
▲ Farmers gathered round 10 sheep used in an age of ewe competition which was a feature of the 1960 Ruakura Farmers' field day.

By G. R. MACKINTOSH,
Livestock Instructor, Department of Agriculture, Hamilton

THE age of the stock owner's breeding stock has always been of such importance to him, whether in New Zealand or any other pastoral country, that an easy method of determining it is necessary. Particularly does this apply to the sheep breeder. The classification of adult sheep into age groups by the time-honoured system of "mouthing" has become increasingly difficult and inaccurate. A uniform age-marking system would eliminate the need for guesswork in judging the age of sheep. The following article describes a system that is being used by a large and increasing number of sheep breeders in Auckland Province.

RATHER than go through the laborious task of examining the teeth of each animal and raddle marking it, many an early sheepman followed his own way of marking the ears of sheep so that it was a simple matter to draft off any particular aged sheep as the mob came through the race.

These individual systems usually took the form of a small notch in a particular part of an ear. Only a small cut, about ¼ in. deep, was made, usually with the point of the owner's earmarking pliers. This was found enough to identify a sheep of any one age as it travelled through the race. Age marking became an indispensable part of a breeder's practice, but his system of marks was of benefit to himself only.



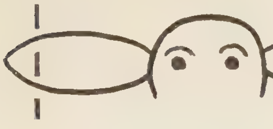
The five-year cycle described on this page.

Uniform Age Marking Recommended

The advantage of a uniform, universal system of age marking was first suggested by a Mr R. E. McClure, a Raglan hill country breeder. Subsequently it was the subject of a paper given at the 1953 Ruakura Farmers' Conference, where its adoption was unanimously recommended to the then Director-General of Agriculture. It has since been frequently discussed in farming circles, particularly in Auckland Province.

To be of maximum efficiency any system would have to be clear, simple, and foolproof without interfering in the main with the registered flock marks of established breeders. Of recent years the registered flock earmark has become much more important than the wool brand as an owner's means of identifying or claiming his sheep—the title deeds to his stock in other words. Wool branding is of short duration, is usually not distinct, is discouraged because of buyer resistance, and with all-the-year-round shearing can often be removed without suspicion.

The uniform system provides that a third of one or the other ear, whichever suits the breeder, can be retained for age marking thus:



The only obstacle would be to owners whose registered marks occupy the end of each ear—a very small percentage of the breeders. An alteration to such an owner's registered ear marks to leave the tip of one ear free would overcome this; and should a uniform national system be some time adopted, it would have to stipulate age marking at docking time only. He would be foolish indeed who attempted to gain by incorrectly age marking his lambs, because this would readily be noticed by neighbours or others. The practice would "police itself" to a greater extent than many other requirements of the Stock Act. Incidentally, a mark in the ear of a lamb leaves a thin, feathery edge as distinct from a thick, blunt edge in the ear of an adult sheep.

As it fits in with the practice of almost all breeders, a five-year cycle has been adopted as shown above (a breeder's registered earmarks are also shown).

The age mark would show the year of birth. The years ending with a 0 or 5, such as 1960 or 1965, would always have the age notch at the end (or tip) of the ear—always followed in turn by two up, two down, one up, and lastly one down at the end of the cycle. Simplicity itself! Easily understood by any breeder, buyer, shepherd, or saleyard hand!

Market Prices

Those who retain their ewes to the six-year stage would still not meet with confusion, as any competent sheepman can distinguish between a six-year ewe and a hogget at lambing time or between a ewe six and a half years old and a fresh two-tooth at the subsequent culling in late summer. In any case these sheep are rarely run together. In the very few extraordinary circumstances where a breeder desires to keep his ewes until greater ages an additional hole mark on the ear could be made during each second cycle, that is, beginning in the year ending with a 5 (1965, 1975, etc.), or alternatively the modern tags could be used during this second cycle. In brief, there is no justification in sacrificing an efficient, simple, and easily understood scheme of considerable potential benefit to the industry because of such circumstances.

The price paid for five-year-old ewes each year is largely determined at the yearly sheep fairs, where real five-year-olds often compete with so-called five-year-olds. If all or most of the sheep at our sheep sales carried a uniform, reliable age mark, the price for genuine five-year-olds would be enhanced. The price level so set would favour the age-marked sheep, even though other breeders negotiated sales privately. The honest breeder would be placed at the advantage which he deserves.

Each year hundreds of thousands of breeding ewes pass through New Zealand saleyards. Just what percentage of these are sold true to label? A well known Waikato breeder each year offered his well branded, age-marked five-year-old ewes at the first sheep fairs and frequently saw those sheep he had sold the previous year as five-year-olds again offered as such. Experiences like this could be multiplied hundreds of times each year. Another prominent farming leader saw a breeder sell his six-year-olds at a King Country sheep fair, and the buyer sold the same sheep two days later at a Waikato sheep fair as genuine, age-marked, King Country five-year-olds!

Age and Constitution

The productive efficiency of all animals is substantially determined by their age. Particularly is this so with breeding ewes. Good health, vigour, and constitution are more likely to be possessed by a medium-aged sheep than an old one to which the extra years of life have brought the natural degeneration of vital organs; or have provided longer in which to collect the parasites that cause the weakening disease of hydatids; or to experience the seasonal conditions that cause facial eczema and liver damage. Malformed hooves become more pronounced with age, and it follows that as ewes become older they have a greater tendency to contract foot rot and so spread the disease. As with all animals, particularly females, age in a ewe takes its toll in one way, if not in another.

Though older sheep may sometimes have more even and better teeth than younger ones, they are not necessarily more thrifty or more efficient lamb and wool producers. Indeed they are frequently less efficient, particularly if

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bush sickness

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Bush sickness is due to a deficiency of cobalt in the soil. Vitamin B.12 is essential to the health of animals subsisting on a vegetable diet and cobalt is part of the Vitamin B.12 molecule. For details of the latest and most suitable methods of administering cobalt to your stock, contact the Department of Agriculture office.

Cobalt Compounds are produced by **THE MOND NICKEL COMPANY LIMITED ENGLAND**
N.Z. Agents: **DICKINSON MYTTON LIMITED** *204 Crawford Street, Dunedin, C.1*
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The NEW Firestone

ALL-TRACTION CHAMPION TRACTOR TYRE

NEW SCIENTIFIC SIDEWALL CONSTRUCTION

Gives greater resistance to damage and flexing, more strength and better stability.

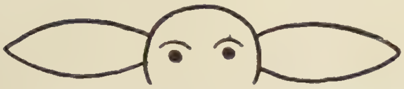
Gives
NO EXTRA COST !
GREATER PULL !
LONGER LIFE !

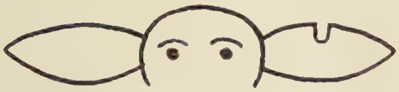
New Firestone Rubber-X Tread Compound gives up to 25% longer, more efficient tread life.
New Super Cord Body with high tensile strength is insulated and tensioned with Firestone's exclusive shock fortifying process.

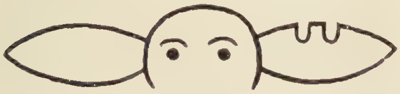
Firestone

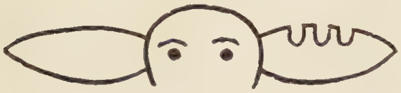
THERE'S A FIRESTONE TYRE FOR EVERY WHEEL THAT TURNS ON THE FARM.

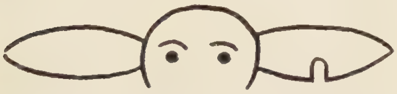
Western Australian System (sheep only)

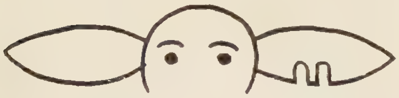

1959: clean


1960: one notch, front


1961: two notches, front


1962: three notches, front


1963: one notch, back


1964: two notches, back

the younger but poorer "mouthed" ewes are placed on luscious pasture. Health and constitution are as important as teeth. If an owner offers his five-year-olds in the next pen to his six-year-olds, the price received for one in comparison with the other, even though their teeth look exactly alike, will show the fat-lamb breeder's opinion of the difference in value of just one year of age.

Most sheepmen have thought that they could determine the age of sheep by examining their teeth, but with years of greater and wider experience many will admit that it is not so easy. Four-year-old ewes have been known to have so broken a mouth that they could almost be called "gummies". It is not intended to condemn those whose ewes are cast for age by an examination of their teeth only. A competent flockmaster may become more or less familiar with the degree of teeth wear in his flock. He may thus attain a fair measure of accuracy in his estimates of age in his own flock.

← The idea that if a stock owner wishes to age mark his stock he should be permitted to do so only if he adheres to a uniform national system is not new. As far back as 1905 the Western Australian Government laid down a six-year cycle which anyone who wishes to age mark must follow. The diagram shows that it is not so fool-proof or easily followed as the one adopted by the Auckland farmers.

In Kenya, too, a uniform age-marking system has been in use for years. →

Neither of these systems would be suitable under conditions in New Zealand, where farmers have made registered earmarks on both ears for greater clarity and distinction.

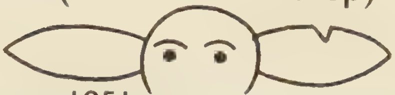
Flock Replacements

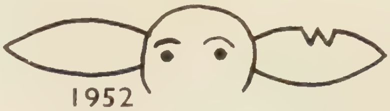
What, however, is the position of that large section of the farming community, the fat-lamb producers, when attending fairs in quest of replacement ewes? We all know that tooth wear in sheep varies greatly between district and district, season and season, or from farm to farm, and even between sheep of similar age in the same flock. One pen of five-year-olds with failing mouths is offered alongside a lot of five-year-olds with splendid mouths—much better mouths in fact than a third pen offered as four-year-old ewes. Further along a pen of genuine six-year-old ewes is offered as such, with mouths better than many of the five-year-olds. All this causes confusion, suspicion, and distrust among fat-lamb breeders, to the disadvantage of the ewe breeders, be they ever so honest and conscientious.

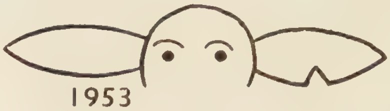
Excessive wear in sheep's teeth has become a national problem in New Zealand, though it is not found to any great extent outside this country. Dr C. R. Barnicoat's studies over many years have shown that this problem is closely related to the improvement of hill country pastures with ryegrass and white clover.

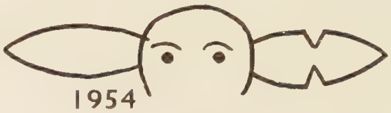
Uniform age marking would enable a much more accurate assessment of the true economic life of our ewes, especially those coming from particular breeders, than can be learnt from their teeth. One of the most prominent Auckland breeders advised a regular buyer of his five-year-old ewes to retain them for an extra season rather than send them to the freezing works, after weaning their lambs, at six years old. There is much evidence that other fat-lamb farmers are using less well bred ewes to a very much greater age than six years.

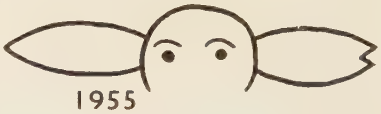
Kenya System (cattle and sheep)

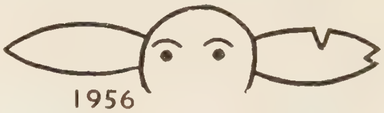

1951

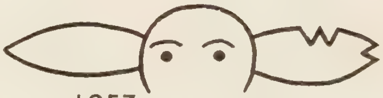

1952

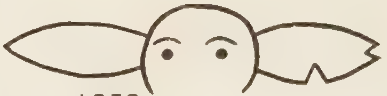

1953

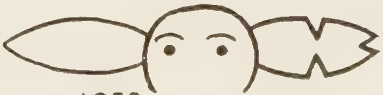

1954

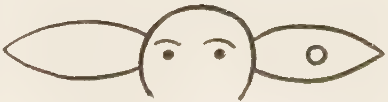

1955


1956


1957


1958


1959


1960

AGE MARKING SHEEP . . .

Age-judging Competition

In conjunction with an age-marking exhibit at the Ruakura Farmers' Conference in 1960, the executive of Waikato provincial district of Federated Farmers under the leadership of Mr A. W. Moore conducted a competition in assessing by mouthing and from general appearance the age of 10 Romney ewes typical of the ewes to be seen at any fair. These ewes, metal-tagged at birth, were taken from two Waikato flocks. One was 10 years old, three were nine years, two were eight years, three were seven years, and the last one was three years old. A total of 266 sheepmen from districts as far afield as Hastings, Masterton, New Plymouth, Taihape, and Whangarei competed. The results were most revealing. The best card returned had only four out of ten correct.

Wrong Assessments of Age

This and the fact that over 60 per cent of the competitors did not assess the age of any one sheep correctly is a strong indication of the inability of any sheepman to assess the age of adult ewes. A complete survey of all the competitors' cards revealed that 92 per cent of all the age assessments were wrong. This figure, and the 60 per cent of competitors with no correct answers at all, surely spotlights the inability of sheepmen in this respect.

Another highly significant fact was that 78 per cent of the answers underestimated the true age of the sheep. This figure was lowered considerably by the inclusion of the three-year-old, the age of which was overestimated by every competitor. If this particular sheep had not been included, the percentage of underestimated ages would have been 96.

These results show that farmers have been so accustomed to regard cast-for-age ewes as five-year-olds that they automatically tended to class the sheep as being near that age.

Possible Unscrupulous Trading

If this competition did nothing else, it made many farmers more aware of the possibility of unscrupulous trading on the five-year-old market and also made them realise that the profitable life of a genuine five-year-old is probably much greater than they thought. Uniform age marking is therefore likely to strengthen the price of sound aged ewes also.

To demonstrate the ease, practicability, and usefulness of uniform age marking, increasing numbers of sheep breeders of the Auckland, Bay of Plenty, and Waikato provincial districts of Federated Farmers are following the system.

Mr Moore, writing in "The New Zealand Meat Producer" (November 1960), notes that it is strongly supported by the Department of Lands and Survey, the State Advances Corporation, and some stock and station agents and banks. "The superintendent of land development at Rotorua," he adds, "thought it a splendid thing for the sheep industry, and adopted the scheme last year."

Retail Meat Trade

Last January every pen of ewe lambs at one Waikato lamb fair carried the 1959 uniform mark. The full benefit to the industry will not be apparent until those lambs become full-mouthed ewes. But there is a benefit to be derived from age-marked wethers as well as ewes.

Well-done hoggets often cut a second pair of incisors immediately after the first pair and sometimes cut four permanent incisors at the "two-tooth" stage. (This phenomenon is the reason behind the labelling of stud rams as "one shear" or "two shear" instead of "two-tooth" or "four-tooth".) It can upset the butcher market considerably.

A Rotorua butcher bought a line of 300 hoggets of which about 70 per cent had cut their second pair of teeth before the end of February. At the abattoir these were downgraded from "hogget" to "wether mutton" because the meat inspectors had to age them on the number of teeth, and the butcher lost money. The same situation can arise between "wether mutton" and "ewe mutton" grades in older sheep.

After Mr Moore's article in the "Meat Producer" the N.Z. Meat Retailers' Federation wrote to the Dominion Council of Federated Farmers in support of compulsory age marking, but the council preferred to leave the ultimate decision to the sheep industry itself.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:

NORTH ISLAND

January

20 and 21 January—Feilding I., A., and P. at Feilding.
20 and 21 January—Wairoa County A. and P. at Wairoa.
*27 and 28 January—Horowhenua A. and P. at Levin.
28 January—Galatea A. and P. at Galatea.
28 January—North Kaipara A. and P. at Paparoa.

February

*1 February—Marton District A. and P. at Marton.
3 and 4 February—Rodney A. and P. at Warkworth.
*4 February—Rangitikei A. and P. (Golden Jubilee) at Taihape.
4 February—Woodville A. and P. at Woodville.
4 February—Katikati A. and P. at Katikati.
*7 and 8 February—Dannevirke District A. and P. at Dannevirke.
8 February—Te Awamutu A., P., and H. at Te Awamutu.
10 and 11 February—Taranaki A. and P. at New Plymouth.
10 and 11 February—Taumarunui District A. and P. at Taumarunui.
11 February—Hukerenui A. and P. at Hukerenui.
11 February—Tauranga A. and P. at Tauranga.
11 February—Pahiatua A. and P. at Pahiatua.
14 February—Otorohanga A. and P. at Otorohanga
16 February—Matamata A. and P. at Matamata.
17 and 18 February—Franklin A. and P. at Pukekohe.
17 and 18 February—Ohura A., P., H., and I. at Nihoniho.
17 and 18 February—Masterton A. and P. at Masterton.
*18 February—Te Puke A. and P. at Te Puke.
18 February—Northern Wairoa A. and P. at Mititai.
22 February—Te Kauwhata A. and P. at Te Kauwhata.
24 and 25 February—Wellington and Hutt Valley A. and P. at Trentham.
24 and 25 February—Te Kuiti and District A. and P. at Te Kuiti.
25 February—Waiapu A. and P. at Ruatoria.
25 February—Mangonui County A. and P. at Kaitaia.
*25 February—Whakatane A. and P. at Whakatane.
25 February—Waimarino A. and P. (Golden Jubilee) at Raetihi.
25 February—Putaruru District A. and P. at Putaruru.

March

*1 March—Morrinsville A. and P. at Morrinsville.
4 March—Opotiki A. and P. at Opotiki.
4 March—Albany A. and P. at Albany.
11 March—Kumeu District A. and H. at Kumeu.
18 March—Wellsford A. and P. at Wellsford.

SOUTH ISLAND

January

*21 January—Waiau A. and P. at Tuatapere.
21 January—Golden Bay A. and P. at Takaka.
21 January—Peninsula Horse and A. and P. at Duvauchelle.
21 January—Waikouaiti A. and P. at Waikouaiti.
24 and 25 January—Otago A. and P. at Dunedin.
28 January—Banks Peninsula A. and P. at Little River.
28 January—Palmerston and Waihemo A. and P. at Palmerston.

February

2 February—Cheviot A. and P. at Cheviot.
*11 February—Inangahua A. and P. at Reefton.
18 February—Murchison A. and P. at Murchison.
25 February—Kaikoura A. and P. at Kaikoura.
25 February—Buller A. and P. at Westport.
25 February—Central Otago A. and P. at Omakau.

March

4 March—Temuka and Geraldine A. and P. at Winchester.
*4 March—Rai Valley A. and P. at Rai Valley.
4 March—Amuri A. and P. at Rotherham.
11 March—Mayfield A. and P. at Mayfield.
*11 March—Mt. Benger A. and P. at Roxburgh.
14 March—Lake County A. and P. at Arrowtown.
18 March—Hawarden A. and P. at Hawarden.
*18 March—Upper Clutha A. and P. at Wanaka.
*25 March—Methven A. and P. at Methven

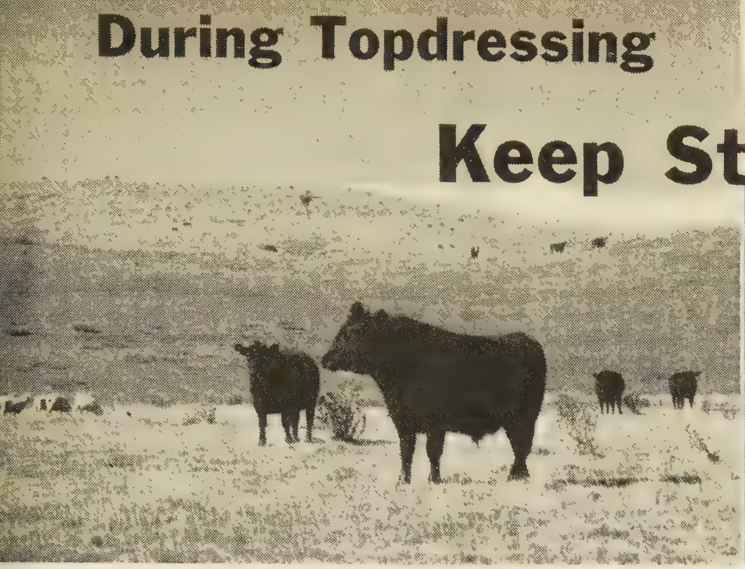
April

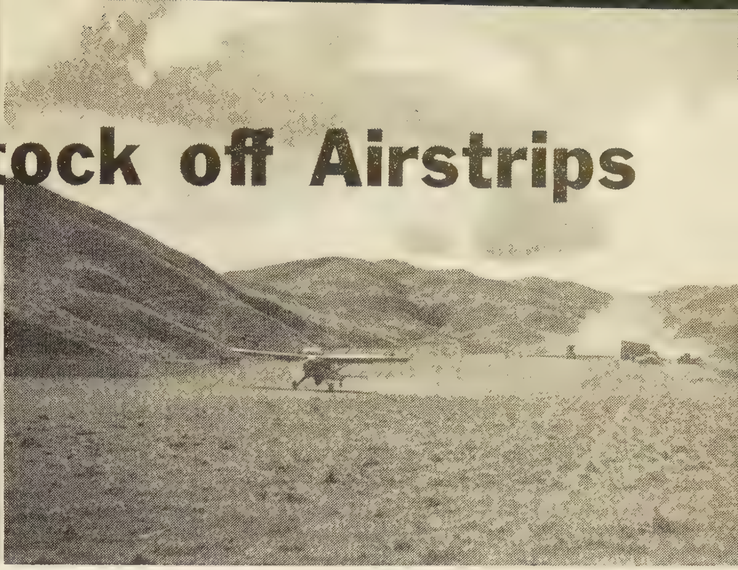
3 April—Strath-Taieri A. and P. at Middlemarch.
3 April—Mackenzie Highland Show at Fairlie.
8 April—Oxford A. and P. at Oxford.
*15 April—Malvern A. and P. at Sheffield.

* The Department of Agriculture exhibit will be staged at this show.

During Topdressing

Keep Stock off Airstrips





THE recent loss of the life of an experienced topdressing pilot whose aircraft crashed after hitting cattle is a tragic pointer to the risk that wandering stock expose airmen to on farm airstrips.

SINCE aerial topdressing of farm land began some 10 years ago stock have been a serious hazard to pilots, and the danger of allowing them near an airstrip while aircraft are using it needs to be universally appreciated. Before this recent fatality there had been several aerial work accidents with stock on strips and a large number of aircraft had been damaged.

Circumstances of Accident

A report of the Accidents Investigation Branch of Air Department on the fatal accident says that a competent and conscientious topdressing pilot with 2,488 flying hours to his credit was flying fertiliser from an airstrip on a fine day with unlimited visibility. After completing a 5-ton contract he waited about two hours for another load to spread on another property. During this time cattle congregated on the strip near the aircraft.

On the arrival of the fertiliser and while he was waiting for the first load to be prepared the pilot made a number of low passes along the strip to disperse the cattle to the right of the take-off run.

He landed, the hopper was loaded, and the fatal take-off was started. The loader operator saw two black cattle appear over the edge of the steep sloping ground on the left of the aircraft and run across the strip. He saw the aircraft assume an acute nose-high attitude just before the tail unit struck the cattle.

The impact tore off the tail elevators and the aircraft squashed heavily on to the strip and ran straight ahead, to disappear over the edge of the slope at the end of the strip.

The aircraft was found crashed on its side and on fire. The impact had forced the fireproof bulkhead into the cabin and trapped one of the pilot's legs. The rescue party persisted in their efforts to release the pilot despite the intense heat and the possible danger from exploding petrol tanks, but he was shockingly burnt and died the next day.

The Chief Inspector of Accidents points out that some farmers may not appreciate that once an aircraft is committed to the take-off or landing run there is little the pilot can do to avoid an accident if stock stray on to the strip. He may collide with the stock, swing the aircraft off the edge of the strip, or try to drag the aircraft off the ground in a semi-stalled condition as in the case described.

Precautions Farmers Should Take

Usually aerial topdressing operations last for only a day or two and the safest practice for farmers to follow is to clear all stock from the paddock surrounding the strip for the whole time topdressing is being done. If this is not possible, a man should be stationed to ensure that they do not stray over the airstrip. Temporary fencing of the strip, though effective, would entail more work. The ground surrounding a strip often prevents the pilot seeing stock which may be close to the edge of the strip.

Farmers will be the first to appreciate topdressing pilots' immense contribution to New Zealand's agricultural prosperity and should be ready to do everything possible to prevent wandering stock from endangering their safety.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during October 1960 and for the 3 months ended 31 October 1960 with comparative figures for the same month and for the 3 months of 1959 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
October 1960	22,740	389	23,129	—
October 1959	23,698	418	24,116	—
Decrease	—958	—29	—987	—4.092
3 months ended 31/10/60	54,005	902	54,907	—
3 months ended 31/10/59	53,143	868	54,011	—
Increase	+862	+34	+896	+1.659

Butter in store at 31 October 1960 was 20,287 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
October 1960	9,276	2,229	11,505	—
October 1959	9,564	2,590	12,154	—
Decrease	—288	—361	—649	—5.339
3 months ended 31/10/60	18,990	4,147	23,137	—
3 months ended 31/10/59	18,222	4,307	22,529	—
Increase	+768	—160	+608	+2.698

Cheese in store at 31 October 1960 was 12,694 tons

If these figures are converted into butterfat equivalent, there is an increase of 1.836 per cent in butterfat graded for the 3 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese which are used on the local market and products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

increasingly

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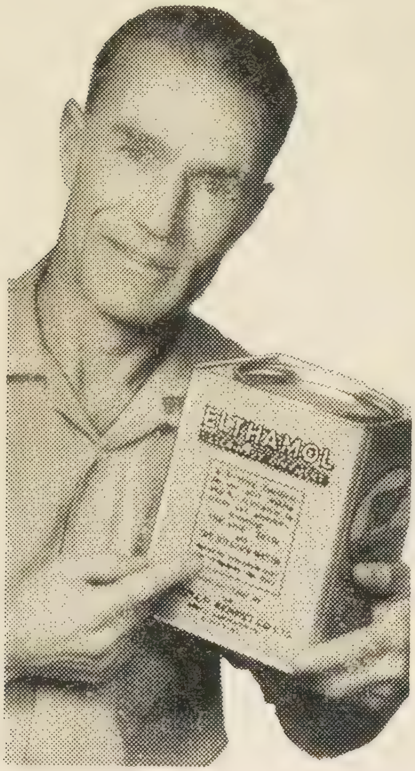

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So safeguard your herd against the irritation and sorenesss of chaps, cracked teats and bruised udders. A cow that is comfortable at milking time will allow herself to be milked more freely and more speedily.

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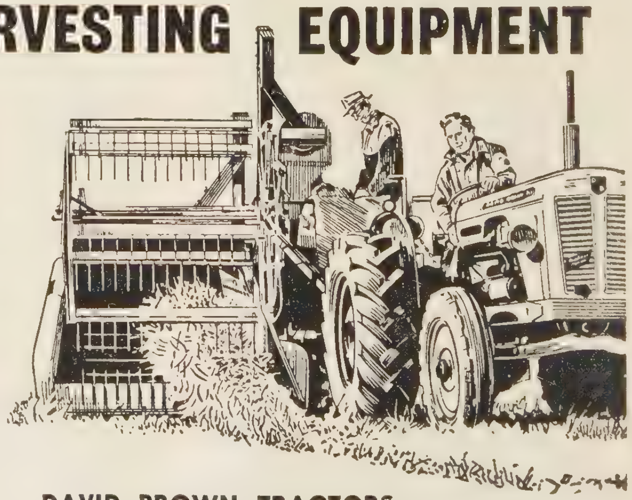

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Animals Protection Act 1960

THE scope of legislation protecting animals was extended considerably by the Animals Protection Act 1960, passed during the last parliamentary session. Provisions of this Act which are thought most likely to interest farmers generally are presented in simplified form below. Such a simplification cannot be exhaustive or precise enough to be legally reliable; farmers can get a copy of the Act from the Government Printer.

PERSONS other than direct offenders may become liable to prosecution as parties to offences if they knowingly permit them or fail without reasonable cause or excuse to prevent commission or continuation of them. This applies to:

Owners of animals or persons in charge of animals.

Owners or occupiers of land.

Parents of, or persons in charge of, children under 16.

Cruelty Offences

Cruelty offences include:

- Cruel ill-treatment of any animal.
- Slaughtering, branding, mutilating, confining, or carrying an animal in such a manner or position that unnecessary suffering is caused.
- Spaying of a cat or dog or docking of a horse over 12 months old by a person other than a veterinary surgeon or practitioner (who is required to use a suitable anaesthetic).
- Promotion or participation in events in which live hares are coursed or are killed in a confined space or animals are released for the purpose of being shot at.
- Taking any part in, or being a spectator at, events in which animals fight or are baited.
- Keeping an animal alive when, because of its condition, it is cruel to do this; or selling or trying to sell, except for slaughter, an animal in this condition.
- Not allowing a dog normally tied up or closely confined reasonable daily exercise, unless there is a satisfactory reason for the omission.
- Permitting an animal to be led or ridden on highways, or conveyed by any form of transport, when unfit to be handled in this way. (This does not apply to an animal being taken to a pound or one which becomes unfit while on the way to a slaughterhouse.)
- Wilfully abandoning any animal (except a bird).
- Giving an animal a poisonous or injurious material or putting a corrosive substance on it without reasonable cause or excuse.
- Laying or dropping of poison in a public place or any place adjacent thereto in a borough, town district, or county town; or within 3 chains of any highway elsewhere; or on any land or premises not occupied by the person distributing the poison. (If poison is to be buried, it must be placed at least 2 ft below the surface.)
- Failing to take reasonable steps to end the suffering of a dog which has been maimed during an attempt to kill it, as permitted under the Dogs Registration Act 1955.
- Placing a pig ring or similar contrivance in an animal's tongue. (Instances have been reported of this being done to prevent calves sucking one another.)
- Failing to milk out a cow within 18 hours before it is offered for sale.

Aggravated Cruelty

Cruelty which results in the death of an animal or which causes it to be so badly maimed that it has to be destroyed is designated "aggravated cruelty", the penalty for which is imprisonment up to two years or a fine up to £500 or both.

Disqualification

A person convicted for a second time of cruelty to animals may be disqualified by the Court from having custody of them. The offender may after 12 months from the date of the order apply for removal of this disqualification. The Court may remove or vary the disqualification or may refuse the application.

Transport of Stock

Consignors of animals must arrange, where necessary and it is practicable, for them to be off-loaded for feeding and watering. Transporters are responsible for providing reasonably comfortable and secure accommodation.

Trapping

Traps and similar devices for catching animals such as rabbits, hares, opossums, and wallabies must be inspected once every 24 hours and trapped animals removed at the time of inspection.

Farm Practices Permitted

Dehorning, castration, earmarking, and tailing, provided they are done with as little suffering as is reasonable, are permitted. Animals must be killed without inflicting unnecessary suffering.

Powers of Inspectors

Inspectors appointed under the Act are entitled to inspect animals in any vehicle, aircraft, ship, or premises or on any land. To enter a dwelling an inspector must have authority from a Magistrate or Justice of the Peace.

An inspector may, pending Court proceedings, take possession of any animal if he has reasonable cause to believe that an offence under the Act is being, or has been, committed against the animal. He may also go on to a property or into a building to supply food and water to an animal confined without them for 24 hours. Before going into a house he must have authority from a Magistrate or Justice of the Peace.

If an inspector believes that undue suffering is being caused to an animal by overcrowding, insufficient water, food, or shelter, or insanitary conditions or other defect he can take the necessary steps to prevent or mitigate the animal's suffering or require the person in charge of the animal to do this.

Ram and Ewe Fairs

24 January—Second Feilding (Flock) at Feilding.
1 February—Timaru Stud Ram and Ewe at Timaru (all breeds).
2 February—Canterbury Stud at Addington.
9 February—Canterbury Flock at Addington (mutton breeds).
10 February—Canterbury Flock at Addington (wool breeds).
10 February—Dannevirke at Dannevirke.
17 February—Timaru at Timaru (fat breeds).
10 March—Timaru at Timaru (wool breeds).
28 January—Southland Stud at Invercargill (all breeds except Romney).
25 February—Southland Southdown Flock at Invercargill.
8 March—Southland Romney and Breeds other than Southdown at Invercargill.
22 March—Southland All Breeds at Invercargill.

Wool Sales

23 and 25 January: Napier.
30 January and 1 February: Wellington
15 and 17 February: Christchurch.
22 and 24 February: Invercargill
1 and 3 March: Dunedin.
8 March: Timaru.
15 March: Wanganui.
20 and 22 March: Auckland.
27 and 29 March: Napier.
12 and 14 April: Wellington.
19 and 21 April: Christchurch.
26 and 28 April: Invercargill.
3 May: Dunedin.
20 May: Wanganui.
24 and 26 May: Napier.
31 May and 2 June: Auckland.
7 June: Wellington.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given during February as follows:

1XH Hamilton, 12.33 p.m.

13 February—"Planning Capital Expenditure from Farm Income", by J. D. Currie, Farm Advisory Officer, Department of Agriculture, Hamilton.

20 February—"Autumn Activities", by J. R. Murray, Farm Advisory Officer, Department of Agriculture, Hamilton.

27 February—"Brucellosis", by G. R. Mackintosh, Livestock Instructor, Department of Agriculture, Hamilton.

2XP New Plymouth, 8 p.m.

2 February—"News and Views from the Farm Advisory Division", by B. R. Hedley, Fields Instructor, Department of Agriculture, New Plymouth.

16 February—"Poultry Notes", by B. J. Russell, Poultry Instructor, Department of Agriculture, Wanganui.

23 February—"Radio Vet.", by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

6 February—"Your Livestock Instructor", by J. P. Shennan, Assistant to Livestock Superintendent, Department of Agriculture, Dunedin.

13 February—"Chemical Drain Cleaning", by G. Banfield, Assistant Fields Superintendent, Department of Agriculture, Dunedin.

20 February—"Flushing", by R. G. Buchan, Livestock Instructor, Department of Agriculture, Gore.

27 February—"Grading Apples and Pears", by I. Mayo, Senior Horticultural Inspector, Department of Agriculture, Dunedin.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report", followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays, 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer") and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XB Masterton, Fridays at 6.45 p.m. ("Farm Session").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest"), and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer"), and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service"), and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m., Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m.; Tuesdays at 12.33 p.m.; Wednesdays and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m. ("News for the Farmer").

Meteorological Records for November

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	60.9	+ 1.8	76.5	42.0	3.95	11	+ 0.11	1.54	5	233
Auckland	160	61.3	+ 0.9	72.4	48.8	4.00	12	+ 0.70	1.29	6	222
Tauranga	12	59.8	+ 1.0	74.9	39.8	3.51	15	+ 0.07	1.11	17	212
Ruakura	131	58.3	+ 0.9	74.3	38.0	2.68	18	— 1.00	0.50	17	228
Whakarewarewa	1,006	57.4	+ 0.9	73.2	38.7	3.32	15	— 0.83	1.20	18	173
Gisborne	14	59.5	+ 0.5	79.5	41.5	8.81	17	+ 6.22	4.11	18	172
New Plymouth	160	57.4	+ 0.6	68.0	43.0	2.56	9	— 2.15	0.75	1	254
Kariol	2,125	52.1	+ 0.2	69.5	34.3	2.11	14	— 1.75	0.45	14	
Napier	5	59.6	+ 0.0	77.9	44.0	2.56	13	+ 0.47	0.44	18	175
Wanganui	72	58.2	+ 0.0	74.0	42.2	2.05	11	— 0.57	0.59	14	232
Palmerston North	110	57.8	+ 0.9	72.3	40.8	3.06	14	+ 0.20	0.97	1	177
Waingawa	340	55.6	— 0.5	73.0	34.0	2.57	17	— 0.13	1.46	7	160
Wellington	415	56.2	+ 0.4	66.6	44.2	1.54	11	— 1.83	0.37	14	193
Nelson airfield	6	56.8	+ 1.3	71.7	38.4	0.82	8	— 1.91	0.17	7, 30	270
Blenheim	14	57.8	+ 0.9	79.0	39.9	0.72	10	— 0.99	0.22	14	244
Hokitika South	12	54.2	+ 0.4	71.4	34.9	4.36	11	— 5.57	1.33	2	238
Hanmer Forest	1,270	52.6	— 1.2	74.8	31.0	2.86	12	— 0.62	0.82	7	210
Christchurch	22	56.6	+ 0.3	81.3	35.9	1.81	6	— 0.01	0.96	7	242
Ashburton	323	56.2	+ 0.5	80.2	30.8	2.80	10	+ 0.35	1.17	15	228
Timaru	56	55.8	+ 0.3	77.8	36.1	1.58	10	— 0.37	0.82	30	204
Alexandra	520	58.1	+ 1.7	80.8	38.0	1.48	9	+ 0.40	0.62	14	201
Taieri	80	52.6	— 0.8	72.1	34.1	3.71	16	+ 1.43	0.80	25	167
Invercargill airfield	0	52.4	+ 0.6	72.4	33.3	3.40	13	— 0.24	0.63	1	192
Chatham Island	150	53.4	+ 1.4	63.0	39.4	1.15	19	— 1.08	0.20	23	

How to Grow Glasshouse Tomatoes

THAT production of tomatoes under glass has become a most important feature of commercial vegetable growing in New Zealand is shown by a Department of Agriculture estimate that in 1959-60 about 1,110 growers operated nearly 2,740 glasshouses with a total area of 7,739,000 sq. ft. and an average production of 2 lb of fruit per sq. ft.

For successful production of glasshouse tomatoes the important factors are climate, soil type, site, water supply, and shelter. The cost of establishing glasshouse units is so high that all these factors must be fully considered to avoid losses and poor production.

Serious threats to successful production are the fungous, bacterial, and virus diseases and insect pests which throughout New Zealand are a major problem. Control depends largely on ability to identify the causes of injury to plants or crops.

Because of the continuous expansion of the industry and the factors which must be considered for success, the Department of Agriculture has published a considerably revised version of Bulletin No. 370, "Growing Tomatoes in Glasshouses".

The bulletin discusses fully the factors mentioned and houses, soil preparation, seed sowing, planting, pruning, irrigation, heating, and harvesting. Pest and disease symptoms and control methods are also described.

The bulletin can be obtained for 2s. a copy at all main offices of the Department of Agriculture.

◆

Award in Agricultural Journalism

AN annual award to be made for an outstanding contribution by a member of the New Zealand Guild of Agricultural Journalists to the furtherance of agricultural knowledge and understanding is to be sponsored by the Bank of New South Wales. It is to be known as the Bank of New South Wales Award and is the first to be granted in agricultural journalism in New Zealand. It will be a travel grant of £100 to enable the winner, who will be selected by a committee of the Guild, to visit Australia to study agricultural research and practice.

◆

Maize for Summer Green Feed

Break feeding maize with an electric fence.

By D. J. G. DAVIES,
Fields Instructor,
Department of Agriculture,
Christchurch

EACH season more dairy farmers grow maize for summer green feed. The usefulness of this highly productive, valuable crop is increasingly appreciated, especially during drought conditions, when maize stands out like an oasis in a brown landscape. In Canterbury the crop has proved a reliable safeguard against such dry periods, and is particularly important to farmers engaged on whole milk production or factory supply. Stock thrive on the leafy, succulent stalks, which are highly nutritious, being rich in protein and carbohydrate (sugar). Milk production is well maintained by animals feeding on this high-yielding supplementary fodder.

MAIZE will grow on a wide range of soil types, but is best suited to deep, free-working loams containing ample organic matter and of a high moisture-holding capacity. If an old pasture is to be ploughed up for the crop, cultivation should begin early to allow time for decomposition of the turf and germination of weed seeds so that seedlings can be killed in subsequent working. Strict attention to control of weeds at this time will avoid spraying later.

▼ A flail-type forage harvester loading material for feeding green and for silage.

Front line defence against lice, keds & blowflies!

T.V.L. DIPS & SPRAY FLUIDS

TVL Sheep Dips give maximum protection against lice, keds and blowflies.

To fulfil a variety of needs this season, the TVL range will include formulations based on Aldrin, Dieldrin and Geigy Diazinon.

TVL
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animal
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Plunge Dips!
Shower & Spray
Race Fluids!
Powder Dips!

TASMAN VACCINE LABORATORY LIMITED, P.O. BOX 29, UPPER HUTT.

A self-tipping trailer loaded with chopped material.

Moisture-holding properties of the soil do not need to be particularly good if portable spray irrigation can be used to bring the crop quickly through the ground ahead of the weeds.

Varieties

Trials have shown that the most suitable variety is W643, a productive American hybrid, followed by Pfister 360. In some localities the open pollinated varieties Marigold and Hickory King are preferred, but these have not done so well in Canterbury trials. The variety K05, a recent importation, performed as well as W643 in two block trials at Halswell in the past season. If hybrid maize is being sown for green feed, it is more economical to use seed once removed from the true double hybrid.

Sowing and Seeding

Maize is best sown in November when all danger of frost has passed and while soil is moist and warm. For maize that is to be fed green the objective should be to produce the maximum bulk of leaf with a minimum of thick stalks. Drilling should therefore be in 7 in. rows at a seeding rate of between 70 and 80 lb per acre on a firm seedbed to a depth of 2 in. Lower seeding rates (down to 40 lb per acre) and a wide (14 in.) row spacing are preferable where it is intended to let the crop mature to the early dent (when the lower portion of the cob is past the milk stage and when denting with the finger-nail leaves a distinct impression) or silage stage.

Fertiliser

Because maize is a fast-growing crop, plentiful soil nutrients are essential. The crop is normally ready for feeding 10 weeks after sowing, provided fertilising with nitrogenous and phosphatic manures is adequate. A mixture of 2 cwt of superphosphate and 1 cwt of calcium ammonium nitrate per acre will ensure a uniform strike and rapid growth. Some farmers prefer to topdress nitrogen or to apply it as a banded side dressing down the rows when plants are about a month old; 2 cwt per acre of calcium ammonium nitrate should then be applied and be followed by a light irrigation if the soil is dry. Applications of nitrogenous fertilisers after the crop is established are recommended only for exceptionally clean strikes.

Dairy cows maintaining milk production on fed-out chopped material.

Weed Control

Young maize plants are very susceptible to smothering by annual weeds, particularly fathen. Such weeds can be checked by harrowing with light tripod or tine harrows when the crop is about 6 in. high. This is best done in the hottest part of the day when the maize plants are limp from loss of moisture. Weedkillers are outstandingly successful in maize. A mixture of $1\frac{1}{2}$ lb each of atrazine and simazine per acre gives excellent control. It should be applied as soon as the seed is drilled. It costs more than 2,4-D, but high increases in yield have resulted from the use of atrazine and simazine. Post-emergence spraying should be with amine salt of 2,4-D or MCPA at up to 1 lb per acre.

Utilisation

Of the several methods of feeding maize to stock, mowing the crop and break-feeding it with a single-wire electric fence is recommended because little labour and time are needed and fertility transference is negligible. If the fence is placed within about 4 ft of the standing crop, along the middle of the mown strip, stock will be able to pull the cut material from under the wire without endangering the maize remaining to be fed and with a minimum of wastage. Where on-site feeding is not practicable some farmers prefer to cut and cart out green material with a buckrake. Others who have flail-type forage harvesting equipment do the whole job mechanically, serving the lacerated maize directly to cows from the self-unloading trailer.

Maize surplus to requirements for summer feeding can be allowed to mature to the early dent stage for conversion into valuable silage. Maize silage is best prepared by pre-chopping with a flail type forage harvester before it is consolidated into a suitable pit or silo. As maize is very frost tender, this work should be completed before early frosts.

Further trials are being carried out to determine varieties that are early maturing and most suitable for silage.

◆

Tomoana
FULL-FEED
DOG
CRACKERS

Proved by actual Trials

TOMOANA FULL-FEED DOG CRACKERS ARE ALL THAT WORKING DOGS NEED

IT'S PROOF on the farm that counts, and widespread farm tests of long duration with Tomoana Full-Feed Dog Crackers have proved conclusively that dogs not only relish them, but also accept them as a **complete** food on which they will work with full alertness and vigour.

This completely new type of food—completely sterilised—is enriched with livermeal, and weight for weight, has a much higher food value than meat. Clean, easy to feed, and lasting indefinitely, farmers everywhere are finding them the ideal food, and a major factor in the drive to eliminate Hydatids. Drovers swear by Tomoana Full-Feed Dog Crackers. Write to W. & R. Fletcher (N.Z.) Ltd., Box 594, Wellington, for Free Leaflet giving full details . . . or ask your Merchant.

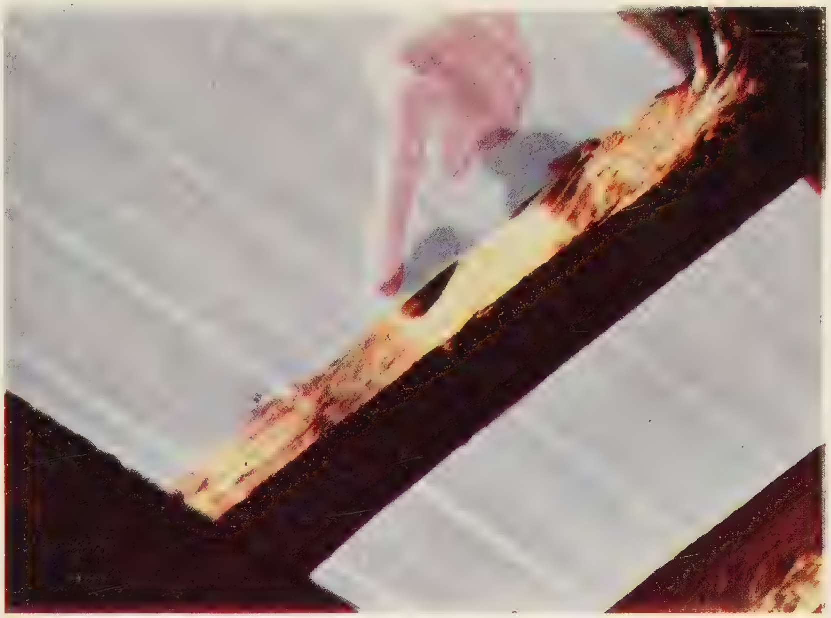
Tomoana
FULL-FEED
Dog Crackers

Fire Hazard in Woolsheds?

Scorching through Plastic Skylights

WHERE a certain type of comparatively clear corrugated plastic sheet has been used as skylights in woolsheds, some purlins or rafters immediately below have been found badly scorched.

WHEN the sun's rays strike from a north-westerly direction in the cases observed the corrugations of the more or less clear plastic appear to have acted as a lens to create a focal point from immediately under the corrugated plastic skylight to at least the depth of a purlin below. This action may carry further, but it is known to reach at least as far as the bottom edge of a purlin.



A purlin beneath a corrugated → plastic skylight that has been scorched by the sun's rays. The charred area is indicated by the finger outside the skylight.

Had a ragged end of building paper been hanging down near one of these focal points, or had inflammable goods been stored near the skylights illustrated, a fire hazard could have been created.

A close-up view of a charred → patch on a purlin under a corrugated plastic sheet.

Fibre glass skylights for woolsheds have been favoured over the plastic type recently because they are cheaper. They diffuse light and do not focus the sun's rays, so that they would not present the fire hazard described above.

—*R. G. MONTGOMERY,*

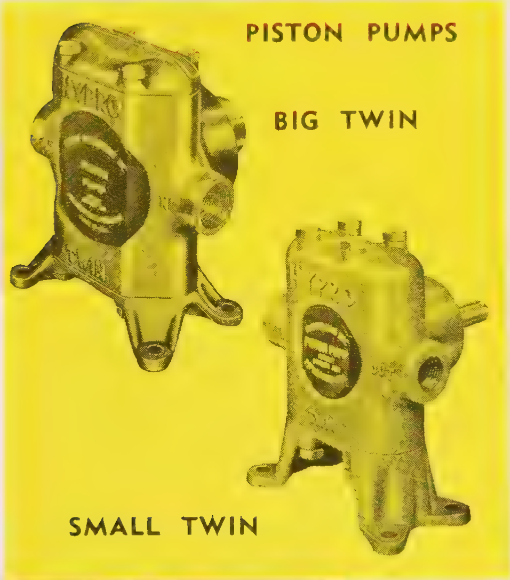
Sheep and Wool Instructor,
Department of Agriculture,
Hastings

NEW ZEALAND'S BIGGEST SELLING AGRICULTURAL PUMP . . .

HYPRO PUMPS

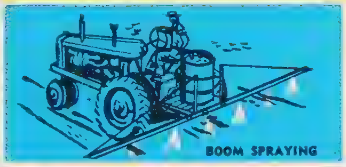
presents an ever increasing range

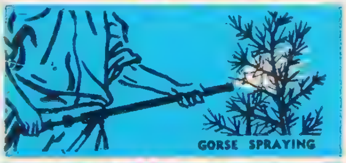
THE HYPRO BIG AND SMALL TWIN PUMPS ARE DESIGNED WITH ALL SPRAYING JOBS IN MIND.



BIG TWIN:
This pump can be operated at pressures of up to 400 lbs. p.s.i. and is adaptable for a wide range of uses, including crop spraying with abrasive chemicals. The performance greatly surpasses that of heavier and more costly ones.

SMALL TWIN:
Ideal for spraying of crops using all chemicals. Operates to pressures of up to 400 lbs. p.s.i. Low horse power requirements. High revving model, low in price.



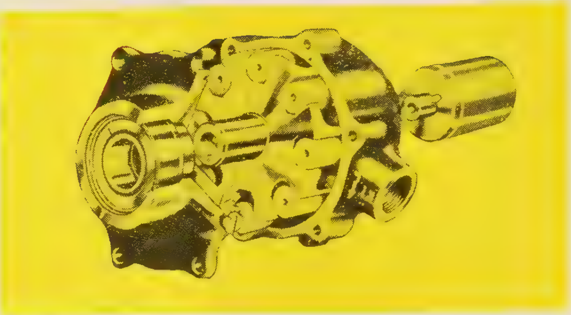


SHEEP SPRAYING

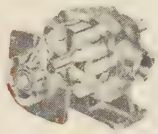
FOR WEED SPRAYING:
Designed for both high and low pressure use, the models N7500 and N6000 are most suitable for pasture spraying as well as higher pressure spraying of gorse and blackberry, etc.

FOR SHEEP SPRAYING:
Hypro Pumps are most suitable and economical for the new sheep sprayers. They provide ample pressure and volume for either Tractor or independent engine drive. For livestock spraying they have the pressure to drive the spray material through the hair or wool and thoroughly cover the hide.

All the above pumps are incorporated in **SENTRY SPRAY EQUIPMENT** as complete Models.



N7500.
High pressure nylon roller pump operates at 350 lbs. P.S.I. either from power take off or independent petrol engine. Little maintenance required.

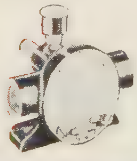


N6000.
Nylon roller pump operates at pressures up to 200 lbs. P.S.I. High and low pressures for gorse or pasture spraying. Operates from power take off or independent petrol engine.

N1500.
This extremely versatile pump can handle liquids and semi-liquids and is available for countless uses in industry and agriculture.

C700.
Revolutionary irrigation pump used from the power take off. 2in. pump (roller type), self priming, pumps water in high volume at pressures up to 40 lbs. P.S.I.

B610.
A really capable general purpose pump in high grade cast bronze. Working pressures of up to 75 lbs.



B12.
General purpose pump. Pumps liquids up to pressures of 30 lbs. P.S.I. Just right for home or Industrial use.

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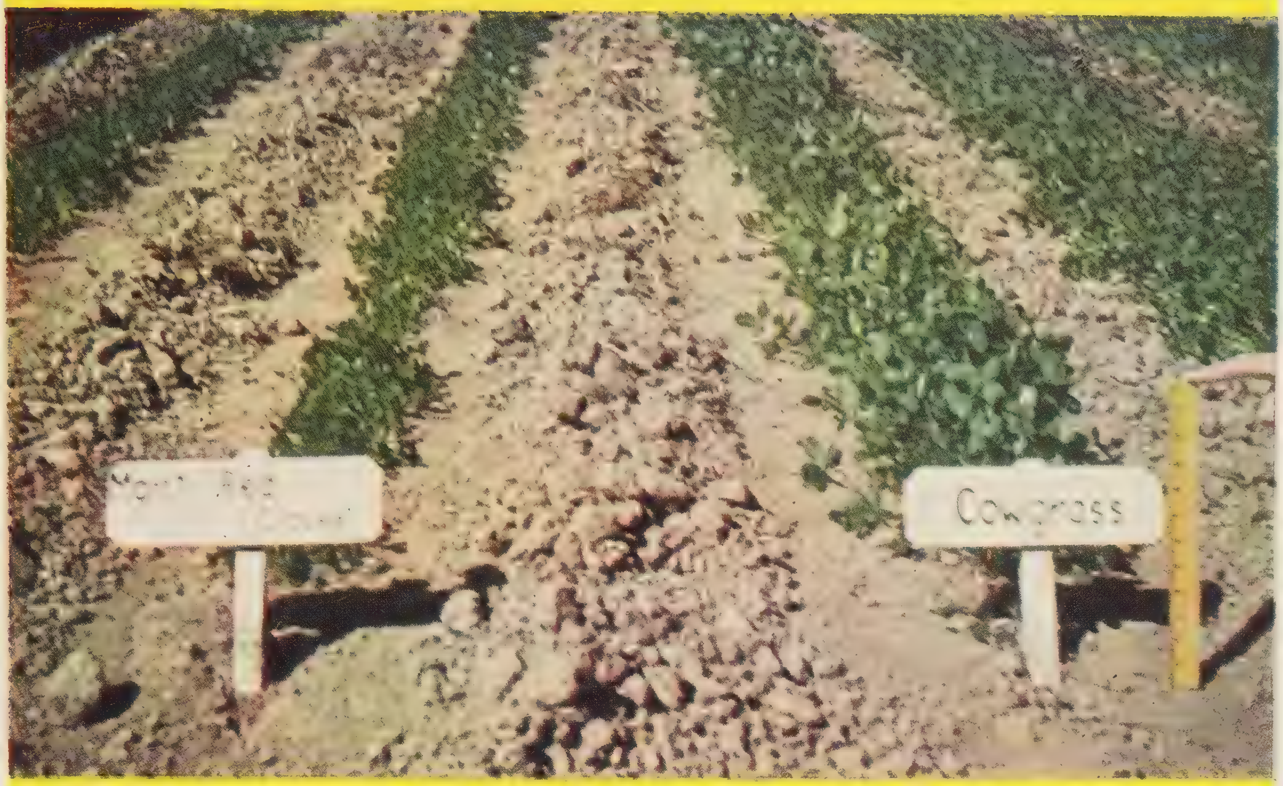

COMPARISON OF RED CLOVER STRAINS

THE performance and persistence of five strains of red clover under low fertility conditions were investigated in a trial laid down in January 1954 on third-class hill country at the Department of Agriculture's Invermay Research Station.

DETAILS OF TRIAL THE following strains were sown in separate plots:

1. N.Z. certified Montgomery red clover
2. Canadian Altaswede, a late flowering red clover
3. N.Z. certified cowgrass
4. American "Strain No. 1", a cowgrass-type selection
5. American "Kenland", a cowgrass-type selection

Each strain was sown with 3 cwt of superphosphate in duplicate plots, the mixture being 15 lb of perennial ryegrass, 3 lb of short-rotation ryegrass, 8 lb of cocksfoot, 3 lb of timothy, 2 lb of N.Z. certified white clover, and 4 lb of red clover.

RESULTS Establishment was satisfactory, though the Montgomery red clover types in particular were small and thin in the early stages. Seven months after sowing the cowgrass types could be distinguished by their more erect and vigorous growth. After 11 months all strains were well established and growing vigorously. Differences in height and growth habit were not marked, but the cowgrass types were less dense. Montgomery red clover in the sward was estimated at 25 per cent, Altaswede at 15 per cent, and the three cowgrass strains from 10 to 15 per cent.

Within two years from sowing the cowgrass strains had largely disappeared from the sward and even Montgomery red clover had become a minor constituent. A low percentage of this strain, however, was still present in 1960, six years after sowing.

Point analysis measurements taken at about yearly intervals from October 1955 indicated the changes in the red clover content of the sward.

PERCENTAGE OF RED CLOVER IN SWARD

Strains	21/10/55	31/10/56	13/1/58	21/11/58	1/2/60
N.Z. certified Montgomery red clover	26	7	6	5	6
Canadian Altaswede	12	4	2	trace	trace
N.Z. certified cowgrass ..	9	4	3	3	1
American "Strain No. 1" ..	3	3	1		
American "Kenland" ..	5	3	trace	—	-

When the trial was closed six years after sowing the sward was dominantly ryegrass and white clover with some cocksfoot, timothy, and weed grass and a low percentage of red clover in most plots. The trial was grazed with sheep during the six years and was never cut for hay.

SUMMARY On third-class hill country similar to that at Invermay Research Station cowgrass strains of red clover cannot be expected to persist much after the first two years. Montgomery red clover proved persistent, but the percentage was low after two years. New Zealand strains sown in this trial compared very favourably, particularly in regard to persistence, with the North American strains tested in this trial.

—*N. A. CULLEN*,
Senior Scientific Officer, Department of Agriculture Invermay Research Station

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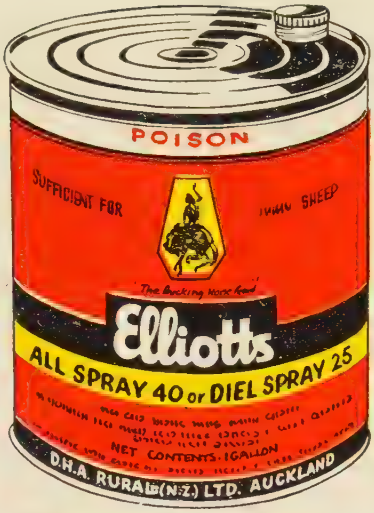
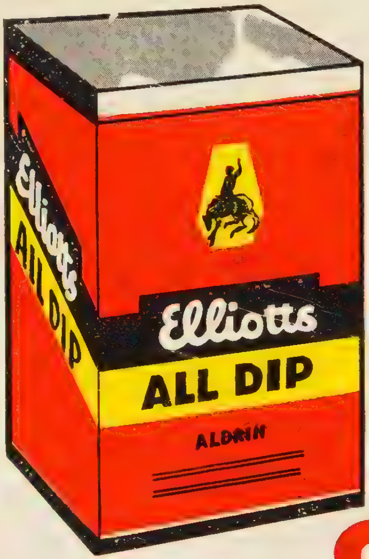
SPRAY DIPPING OR PLUNGE DIPPING


POISON
SUFFICIENT FOR SHEEP
The Bucking Horse Brand
Elliotts
ALL SPRAY 40 or DIEL SPRAY 25
NET CONTENTS 1GALLON
D.H.A. RURAL (N.Z.) LTD. AUCKLAND

FOR LICE, KED AND BLOWFLY CONTROL

Because they work right down the wool fibres to the skin, these economical Spray-Dips have proved outstandingly successful. Sheep may be dipped straight "off-shears". No recirculation of wash . . . no risk of infection . . . no stripping . . . no clogging of jets. Sheep can be treated in any weather except heavy rain, and are easily handled at any time for fly strike control. Especially suitable for use with Elliotts Sentry—Holton Sheep Sprayer.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FOR LICE, KED AND BLOWFLY CONTROL

Like Elliotts Spray-Dips, ALL-DIP works down through the wool fibres, remains effective for many months. One dip gives absolute control and lasting protection against lice, tick and blowfly . . . leaves wool soft, clean, "easy handling". Elliotts ALL-DIP is harmless to the wool, contains bactericides which protect against after-dipping lameness. Use in plunge dip or conventional sheep shower.

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ELLIOTTS SENTRY HOLTON SHEEP SPRAYER

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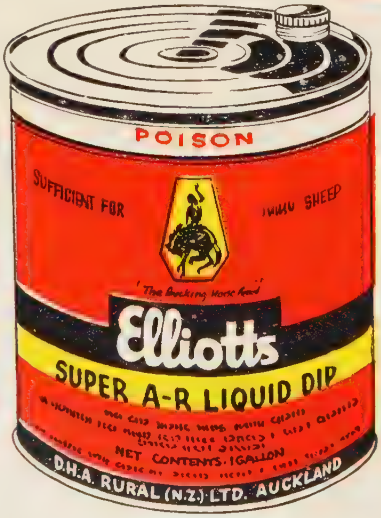
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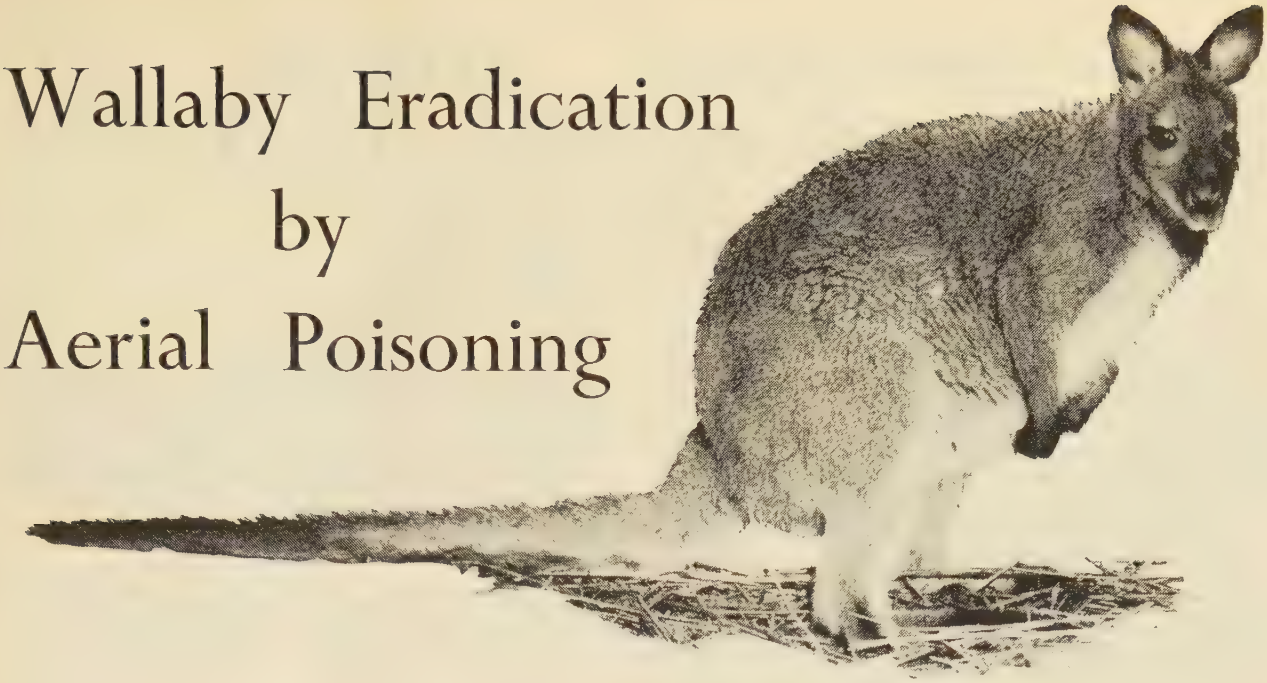
Wallaby Eradication by Aerial Poisoning



By H. J. ELGIE,
Livestock Instructor,
Department of Agriculture,
Waimate

TREMENDOUS progress in the eradication of wallabies by aerial poisoning has been made in the last eight months on more than 80,000 acres of heavily infested wallaby country in the Hunter Hills, South Canterbury, where the kill of wallabies is estimated at 95 per cent.

Wallabies are spread over about a million acres, the main concentration being in about 250,000 acres in and around the Hunter Hills. Infestation ranges from odd, scattered animals to more than one wallaby per acre.

Action was taken after representations had been made to the Government of the danger of the spread of wallabies and of their becoming a national problem. The Rabbits Act was amended in 1959 to allow Rabbit Boards to accept responsibility for destroying wallabies, and a Rabbit Boards Wallaby Destruction Committee formed.

▼ Wallabies were in large numbers in the bush areas over which the baits are being dropped.

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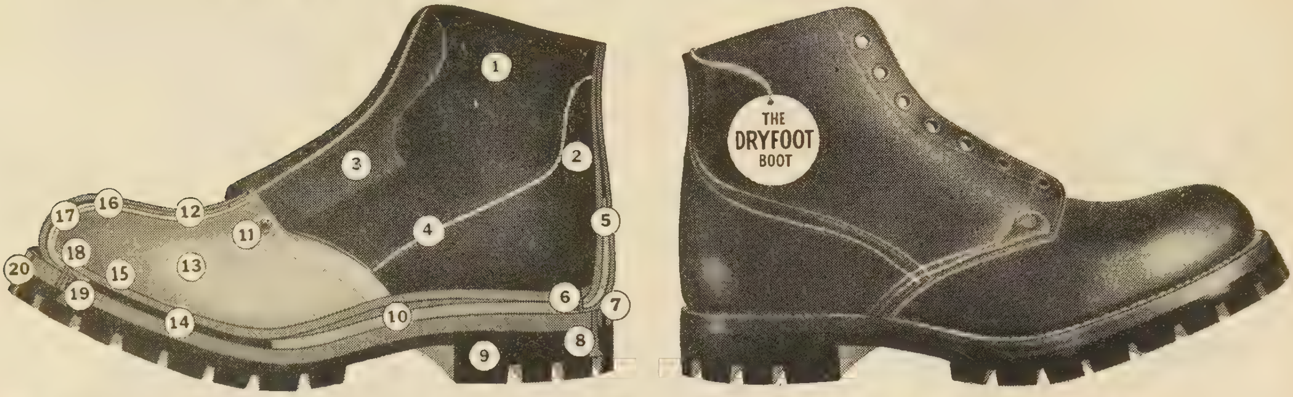
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WALLABY ERADICATION

EIGHTY-SIX years ago three wallabies, two females and one male, were liberated near Waimate, South Canterbury. This was the start of a gradual spread along the Hunter Hills, and by 1947 wallabies had increased to such an alarming extent that some method of control was necessary.

During the winters of 1947 to 1956 wallaby cullers employed by the Wildlife Branch of the Department of Internal Affairs, using rifles in open country and shotguns in areas of dense cover, destroyed 68,608 wallabies. It is very debatable whether this shooting controlled even the natural increase, but it is certain that in that period wallabies spread over a more extensive area.

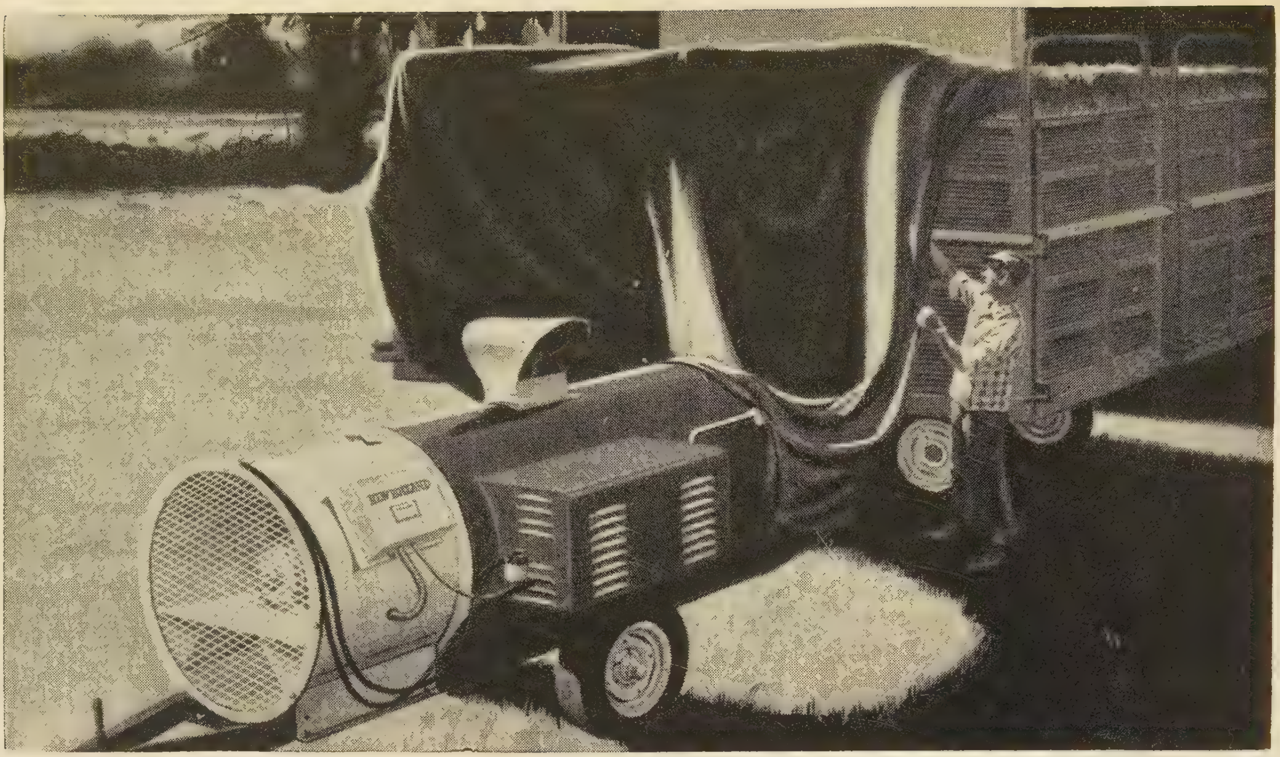
From 1956 until March 1960 there was no organised eradication, but shooting parties in the Hunter Hills must have accounted for many wallabies in the heavily infested localities. Again the wallaby was spread further afield.

During 1958 farmers and runholders in Waimate County were so concerned about the widening infestation of the wallaby that runholders met in Waimate to seek the most effective means of reducing the pest. A committee was formed with Mr J. M. Sutherland as chairman and Mr M. J. Leonard as acting secretary.

The observations of this committee indicated that the wallaby had increased and spread even more than

▲ Preparation of baits for aerial dropping.

▼ Loading of aircraft with poisoned baits.



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was at first thought. Infestation had reached such proportions that though the problem was at the moment of local concern, there was very imminent danger of the spread becoming a national problem.

As a result of representations to Government the Rabbits Act was amended in 1959 to allow Rabbit Boards to accept responsibility for destroying wallabies. A meeting of chairmen of the nine South Canterbury rabbit boards in whose districts there were wallabies was held in Timaru and a Rabbit Boards Wallaby Destruction Committee formed.

The Hunter Hills Wallaby

The Hunter Hills wallaby is known locally as the scrub or black-tailed wallaby. It grows to a height of about 3 ft and weighs from 20 to 40 lb, though odd animals up to 60 lb have been destroyed.

Wallabies are communal living animals, travelling to feed at night and morning and congregating in patches of scrub or bush during the afternoon.

They eat a wide variety of food, including grass pastures, snow tussocks, blue tussock, cotton plant, and native bush. They seriously damage crops such as turnips, chou moellier, and oats, and the produce of market gardens.

Undergrowth and tree seedlings have been cleaned out of the existing bush holding the gullies in the Hunter Hills, which will eventually reach maturity and die. If wallabies were left uncontrolled, natural regeneration would be impossible and erosion and consequent flooding caused by accelerated run-off would result.

Working Operations

With the formation of the Rabbit Boards Wallaby Destruction Committee a supervisor and two men were employed and baiting trials began. A number of experiments showed that bait consisting of pollard, ground linseed, raspberry jam, sugar, molasses, and oil of aniseed was suitable.

Poisoning trials were then carried out with strychnine and arsenic, both of which proved unsatisfactory.

In a baiting trial in 15 acres of thick scrub heavily infested with wallabies, three lines were cut through the scrub and pre-fed twice with 1,000 baits each feed. The baits were readily eaten by wallabies.

On 12 April 1960 the three lines were poisoned, 1,000 baits being used containing 1080 (sodium monofluoroacetate). Inspections for dead animals showed: on 14 April 25 wallabies; on 19 April 30 wallabies and two opossums; on 20 April 13 wallabies; on 4 May 12 wallabies.

Dead wallabies totalled 80, but the fact that no wallabies have been seen in this locality since the poisoning seems to justify the claim of a complete kill.

The committee had thought that with wallabies bait feeding before poisoning would be needed as in the poisoning of rabbits.

However, the two animals are very different and it was thought that the wallabies' keen sense of smell might lure them to the baits if the amount of oil of aniseed was increased.

Four hundred and seventy five 1080-poisoned baits were put down on 5 May 1960 in a lightly infested area. The next day 12 baits had been chewed, and seven wallabies, one hare, and one opossum were found dead, and there was no sign of live wallabies. This very good result decided the committee to try aerial poisoning on a larger scale without pre-feeding. About 600 acres of steep bush country very heavily infested with wallabies was selected and 12,000 1080 baits were air-dropped on 26 May 1960.

At the first inspection on 30 May 10 wallabies and seven opossums were found, and the next day 52 wallabies and 13 opossums. At a third inspection on 2 June 28 wallabies and 11 opossums were found, and on 21 June another eight wallabies were found, making a total of 98 wallabies and 31 opossums.

▼ Wallabies killed all new growth of snowgrass in this area after it had been burnt two years before. Damage to established snowgrass can be seen.

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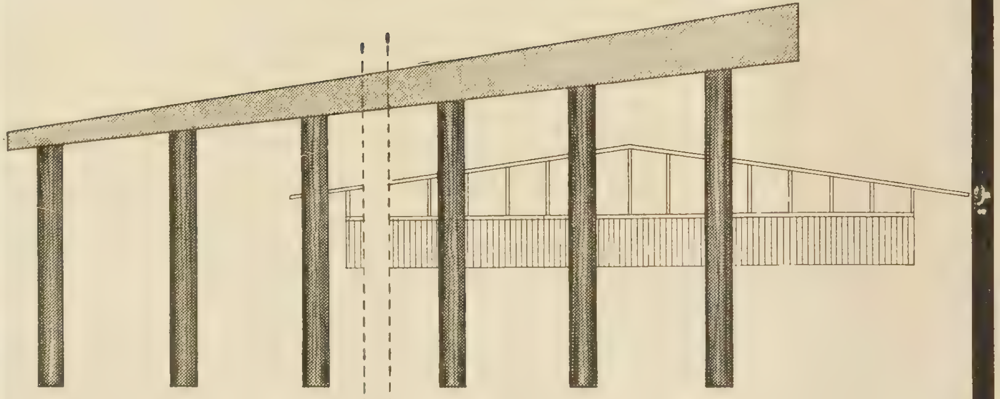

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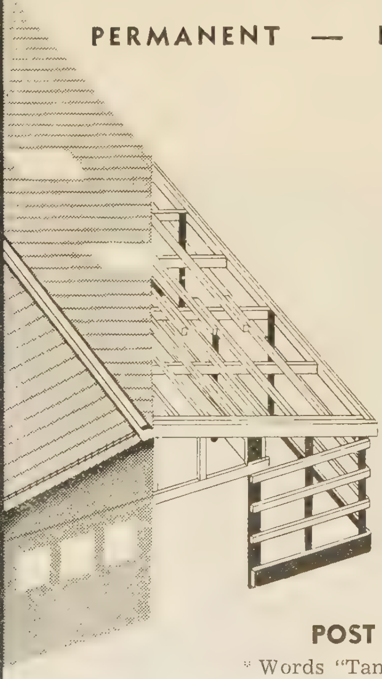

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▲ Dead wallabies. The ten shown were found in less than ½ acre.

The poisoned baits were dropped on very steep, rough bush country where it is almost impossible to find dead wallabies unless one actually walks over them.

The owner of this property estimated a kill of over 90 per cent, and the supervisor of the work and the writer agree that there would be about 900 dead wallabies. The property owner has not seen any live wallabies about this area since poisoning some four months ago.

To determine the lowest strength of 1080 required to kill wallabies and the length of time between taking poison and death, live wallabies were snared and individual poisoning trials carried out by I. G. McIntosh, Senior Principal Scientific Officer, Department of Agriculture Wallaceville Animal Research Station.

It was established that poisoned wallabies took between 12 and 24 hours to die. Up to the time of death wallabies behaved normally, eating and drinking in the usual manner and showing no signs of distress. When death was about to take place the wallabies lay down and appeared to go to sleep. There was no sign of any of the pain associated with use of some other poisons.

Having obtained the information required, the committee began extensive operations. The baits used were made by an Invercargill firm and were found to run out of the hopper of a plane very satisfactorily. The only difference from the original bait used was that oil of raspberry replaced raspberry jam.

The bait mixture was:

Pollard	- 32 lb	Oil of aniseed	- 8 oz
Molasses	- 25 lb	Stock solution of 1080	- *19 oz
Linseed	- 56 lb	Water	1 gallon
Flour	- 16 lb		
Sugar	- 16 lb		
Oil of raspberry	- 8 oz		

* Stock solution of 1080 = 1 lb of powder in ½ gallon of water.

Excellent cooperation from runholders in the Upper Pareora Rabbit Board's district resulted in 14,000 acres of heavily infested wallaby country being poisoned. The airdrop over the area was very successful, runholders expressing amazement at results. The foreman of the Upper Pareora Rabbit Board, who has had considerable experience of poisoning, considered this was the best kill he had seen and estimated it at 90 per cent.

Activities were begun immediately after in the Waihaorunga Rabbit Board's district, where a total of 15,700 acres of heavily infested wallaby country was treated. Again results were excellent. On part of the country 10 days after poisoning large numbers of dead wallabies were found. In one small gully 155 dead wallabies and 23 opossums were found.

Operations were started in the Upper Waihao Rabbit Board's district, where about 7,000 acres were poisoned. In the Hakataramea Rabbit Board's district about 2,000 acres were poisoned, and in the Otaio Rabbit Board's district 4,000 acres.

Tremendous progress has been made by the committee in the past eight months, over 80,000 acres of heavily infested wallaby country having been successfully poisoned. Infestation over this area would be more than one wallaby to the acre, and it is likely that a 95 per cent kill has been achieved.

The significance of this success is that it was achieved while wallabies were still confined mainly to the Hunter Hills, for if such an infestation of the pest had been left alone, there was the danger of its spreading and establishing in any of the extensively grazed and thinly populated country of the South Island.

Great assistance was given by the previous Minister of Agriculture, Mr Skinner, in his prompt decision to launch an eradication campaign through Rabbit Boards and in making immediately available a grant to the committee enabling full-scale operations to be undertaken. Reports of initial work by the Forest Service in wallaby control were a valuable guide to the committee.

The Rabbit Destruction Council and its chairman, Mr G. B. Baker, gave valued advice and assistance, and great credit must be given Mr Sutherland, chairman of the Wallaby Destruction Committee, for his enthusiasm and the tremendous amount he has done in both the field and experimental work.

◆

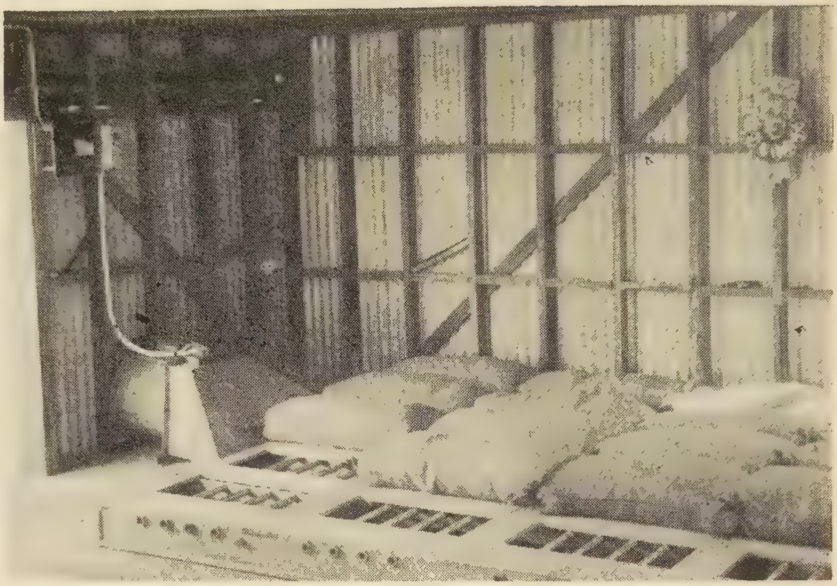
Drying Grain and Seed in Sacks

By L. H. WESTON,
Farm Advisory Officer
(Machinery),
Department of Agriculture,
Dunedin

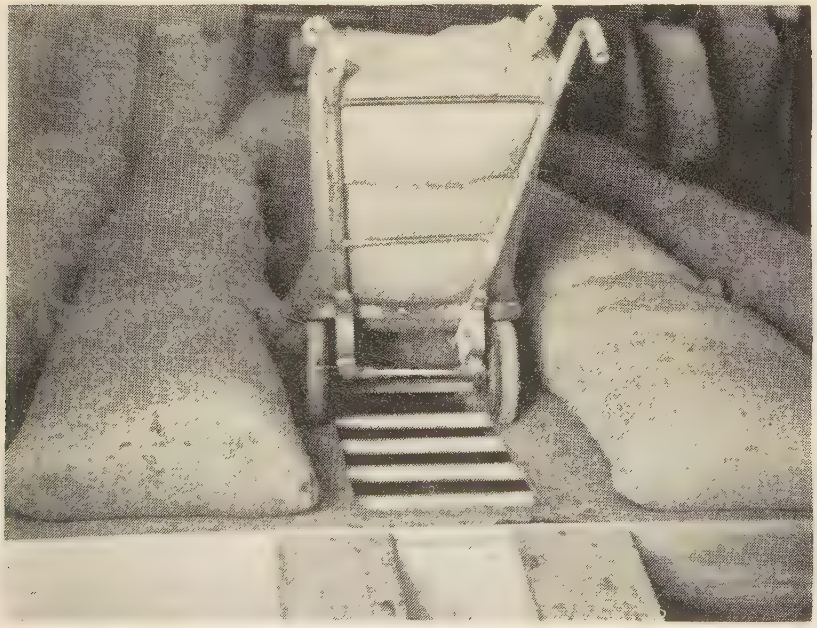
The Department of Agriculture's dryer on the property of Mr A. M. Galt, Southland. Twenty sacks are laid over the holes on the platform. The holes are 13 in. wide by 30 in. long and the sacks are supported by four pipes. A dryer this size takes up about 17 ft x 9 ft. →

On the left-hand side can be seen the fan and heater unit designed to deliver 60 cu. ft. of air per minute for every sack. Ten kilowatts heats the air up to 20 degrees F above air temperature to lower the air humidity so that it takes moisture from the grain.

The hollow platform is sealed with sponge rubber, etc., so that the air pressure can be built up to about ½ in. on the water gauge. This is necessary for wheat and grass-seed. Peas require only 1/5 in. pressure.



- The dryer can be operated on the floor of a shed and is portable.
- Platforms taking from 15 to 30 sacks can be built according to the area of grain grown.
- The system suits the smaller farmer who does not wish to handle and store grain in bulk.
- An electric installation is cheaper initially, clean, safe, and easy to operate.
- Diesel heating can be installed where the power supply is inadequate.
- Costs range from £160 for a small dryer up to £375 for a large diesel fuel burning unit.



← Sacks can be wheeled up short ramps on to the platform, which is only 8½ in. above the floor. Changing over 20 wet sacks for 20 dried sacks takes about half an hour. The sacks must be pressed down to prevent air leakage. Normal sacks straight from the header can be dried, except that with small seeds bags must be loose filled.

When the air humidity is low wheat can be dried from 19 per cent moisture content down to 15 per cent in 10 hours, but during the night and when the air is humid drying may take 14 hours or more.

Drying in good weather costs as little as 5d. per bushel, including power, labour, and capital charges. During wet weather costs rise to as high as 9d. per bushel because of slow drying.

IN cropping districts with a rainfall exceeding 25 in. a year harvesting grain and small seeds with a sufficiently low moisture content is not always possible. The risk of such seed having to be sold at discount or of it becoming a total loss can be avoided by drying the crop, a common practice overseas. A platform for drying seed in the sack has been successfully demonstrated and is described in this article.

THE dryer illustrated consists of a raised hollow platform and a fan with a heater. The sacks are placed neatly over the holes in the platform, so that when warm air is forced underneath it can only escape upward through the sacks and their contents, extracting moisture as it goes.

The relative humidity of the air must be below 60 per cent if it is to dry grain and seed effectively. Occasionally, in hot dry weather, the humidity drops well below this level, but usually it is higher. In fact, at night and during wet weather it is often over 90 per cent. The relative humidity drops when the air is heated. A temperature rise of 15 degrees F is required to lower the humidity below 60 per cent under the worst conditions, so to be on the safe side the fan and heater unit is designed to give a rise of 20 degrees F.

Installation Costs

A small 15-sack all-electric dryer, with a fan delivering 900 cu. ft. of air per minute against ½ in. static pressure on the water gauge, requires a 7½ kilowatt heater and can be installed for as little as £160.

Extra costs will be incurred if heavier wires to the shed are required, if a carpenter is hired to build the platform, and if transport costs are high.

In addition a low-cost moisture tester, wet and dry bulb thermometer for humidity readings, and a dairy thermometer are valuable accessories for which at least £30 should be allowed.

Where the cost of heavy power lines to the shed is excessive, a large dryer with a diesel burner may be installed at an estimated minimum cost of £360. This would be electrically controlled, with automatic safety devices. A comparable all-electric, 30-sack dryer would cost at least £204.

Installation

The flat, airtight floor of a woolshed, seed store, or farm shed can be used for drying. Polythene sheets can be laid on the floor if cracks open up. A sponge rubber strip is used between the platform and the floor to ensure an airtight fit.

Building the platform is not difficult for a farmer who has a good set of carpenter's tools. The point in the construction is to seal joints so that no air can escape. Sponge plastic tape and sealing compounds must be used.

The area occupied by any dryer can be found from Table 1.

TABLE 1—SPACE OCCUPIED BY PLATFORM DRYERS

Sacks	Width	Length of platform	Length with fan
No.	ft in.	ft in.	ft in.
15	8 6	9 4½	13 5
18	10 2½	9 4½	13 5
20	8 6	12 6	16 6
24	10 2½	12 6	16 6
25	8 6	15 7½	19 8
30	10 2½	15 7½	19 8
30	8 6	18 9	22 9

The fan and heater may be placed in a small lean-to shelter just outside the shed if necessary. The platform can be taken up and stored after use to leave the shed clear for other uses. Further details accompany the first illustration, but full plans and specifications can be obtained from the author.

Operating the Dryer

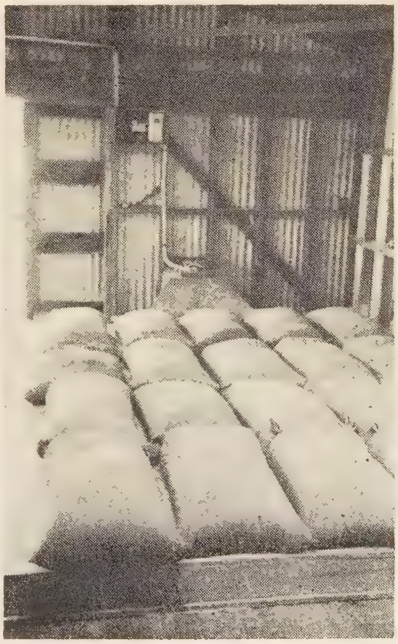
Little attention is required when the dryer is operating, for once the bags are in position and the dryer is switched on the farmer has only to check that all is well and estimate the drying time as described in the caption on the page opposite. Under average conditions, day drying takes 10 hours and night drying 14 hours, so that bags are changed twice a day, involving one to two hours' work.

Sacks are not turned, because moisture would then be taken out of the bottom grain and be re-absorbed by the dry grain on top. Though drying is not perfectly even, there is no danger if the overall moisture content is taken below 15 per cent, and anyway some transference of moisture occurs during storage.

Very wet pockets of damp or green grain may take longer to dry out, so the crop should be left standing in the field until it is evenly ripened.

When grass-seed or clover is being dried the air flow will be greatly restricted and the temperature may rise. If the danger level (105 degrees F) is approached, the heater should be switched to low. More rapid drying can be obtained by loose filling the sacks on the header.

Sweating of grain in the sack after drying is unlikely to occur, but all



Air is drawn from outside → the shed to prevent recirculating air that has already taken up moisture from the grain. Cost of installing the electric unit is very low if three-phase power is already at the shed. Night rate power agreements are not worth while for grain drying, so if power installation and running costs are likely to be excessive, it would be wise to install a diesel heater unit. Single phase power would still be required, but very little would be used, for the fan motor is only just over quarter horsepower.

By building the platform himself a farmer can obtain this 20-sack dryer for about £190. A moisture tester would cost another £30. If a diesel heater is preferred, a 30-sack platform costing about £370 should be constructed and perhaps contract drying undertaken to warrant the extra cost. A 30-sack electric dryer would cost about £210, but power installation charges would be extra.

such danger can be avoided by turning the heater to low for the last five minutes of drying.

Drying Costs

Drying costs are affected markedly by the weather. When the humidity is low and the wheat moisture content only 17 or 18 per cent, only 1 unit per bushel may be used, but during wet weather 3 units may be used. Total costs in Southland varied from 5d. to 9d. per bushel on the 20-sack platform, allowing 3d. per bushel for labour, maintenance, and capital charges.

A smaller dryer will cost slightly more to run; a larger dryer slightly less. The diesel heater will cost less to run, but the total cost per bushel is likely to be much the same as for electric units due to higher capital charges.

Choice of Size

Platforms taking 15 to 30 sacks are expected to be most popular, because any farmer needing a larger dryer will probably prefer to handle and dry his grain in bulk. Table 2 gives recommendations for the size of dryer for various acreages of good cropping land.

TABLE 2—SIZE OF DRYER AND ACREAGE OF CROP

Crop area acres	Recommended dryer sacks
10 to 20	15
20 to 25	18
25 to 30	20
30 to 40	24 or 25
40 to 50	30

The platform dryer is versatile, easy to operate, requires little attention, and is low priced. The worry of harvesting delay and of disposing of out-of-condition grain and seed can be eliminated, with financial gain to the grower.

Many dryers are expected to be installed in Southland and Otago next season. The original platform built by the author has been operating almost continuously for six months, which shows the need for in-sack drying in Southland.

TABLE 3—AIR FLOW AND HEAT REQUIREMENTS

Size sacks	Air flow cu. ft. per min.	Heater capacity kilowatts
15	900	7½
18	1,080	9
20	1,200	10
24	1,440	12
25	1,500	12½
30	1,800	15

Note: Fans of larger capacity than required can be used by restricting the intake or providing a variable speed motor. Axial flow or propeller type fans capable of up to .5 in. static pressure on the water gauges are most suitable.

Correspondence Courses in Agriculture

CORRESPONDENCE courses in agricultural subjects are provided by the two correspondence schools of the Department of Education in Wellington for students in any part of New Zealand who cannot attend day or evening classes in their locality. These schools are the Correspondence School and the Technical Correspondence School.

THE Correspondence School provides post-primary courses in agriculture up to School Certificate standard for both full-time and part-time pupils. Applicants for courses who have had no agricultural experience or have not previously studied agricultural subjects should apply for one of the introductory courses listed as available from the Correspondence School. Further information may be obtained from the Headmaster, Correspondence School, Clifton Terrace, Wellington.

The Technical Correspondence School provides courses of a practical and applied nature for part-time students engaged in agricultural or horticultural work. Details may be obtained from the Principal, Technical Correspondence School, Buckle Street, Wellington.

Free post-primary education for five years or until the end of the year in which he or she reaches the age of 19 (whichever is the longer) is granted to every person in New Zealand. Applicants for correspondence courses who have not completed a five-year period of free post-primary education are therefore entitled to receive their courses free until they have completed that period. Students who already have had five years' free post-primary education have to pay fees for courses at both correspondence schools, but these fees are low and text-books may be hired.

Correspondence School Courses

Farm Practice

A one-year course dealing briefly with the more important branches of New Zealand's agriculture. This course is used as an introduction to the agricultural subjects of School Certificate, but it is also suitable for general study by pupils and adults interested in farming in New Zealand.

School Certificate Subjects

General agriculture. A two-year course covering how a plant grows, seed certification; soils, fertilisers, and manures; crops and pastures; the main types of plant and animal life of interest to the farmer.

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Dairying. A two-year course covering milk, cream, butter, and cheese; their production and distribution; herd testing and improvement; care and management of cattle; use of dairy products.

Biology. A course covering the form and function of plants and animals in relation to their environments.

Horticulture. A two-year course covering plant form, function, and growth in relation to gardening matters.

The School Certificate subjects may also be taken for general knowledge by non-examination pupils. Any number of the above courses can be studied at the same time and provision is made for both written and practical work.

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The course gives a knowledge of the breeding, rearing, and general management of dairy stock under the grassland system of farming practised in New Zealand.

Consideration is given to soil and fertilisers, pasture management, farm layout, shed construction, sharemilking, valuing and purchasing farms, pig husbandry, and farm engineering.

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The course covers principles of breeding, growth and development, nutrition, pasture management, wool, wool types, factors affecting wool production, preparation of the wool clip, and farm engineering.

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The course deals with the general characteristics of arable farming, crops and cropping, stock policy, management of pastures and equipment, budgeting, and the yearly cycle of operations.

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ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture and Department of Scientific and Industrial Research Trials and Experiments

Ruakura

Carcass Dissection Studies

Carcass quality is determined broadly by the proportion of the three major tissues of the meat animal—bone, muscle, and fat. Detailed dissection studies, involving the breaking down of cattle, sheep, and pig carcasses on an individual muscle basis, are providing at the Ruakura Animal Research Station basic information on the process of growth and the way in which this can be influenced by breeding, feeding, and management.

Invermay

Responses to Superphosphate in Terms of Livestock Production Increases

The results given by various fertilisers on pasture are usually measured by use of the mower and expressed as the weight of dried herbage produced, but it is considered that the performance of grazing animals would be a more desirable measure of the value of a treatment. Dependence on mower results in experimental work has arisen because of the high cost of field trials which involve the use of livestock. Nevertheless mowing trials have given and will continue to give a reliable estimate of the responses from various types and forms of fertilisers and in delineating responsive soils.

At Invermay a trial has been designed to give information on the increase in livestock production after annual topdressing with 3 cwt of superphosphate per acre compared with 1 cwt per acre.

Also included in this trial will be two rates of stocking to ensure in the final assessment of results that the degree of utilisation of feed produced does not mask the main effects of the rates of application.

A 26-acre paddock has been subdivided into 20 paddocks on which two-tooth ewes will be set stocked. These ewes will be carried through their productive life on the same fertiliser treatment so that any long-term effect on stock will have an opportunity to arise. An adjacent paddock is to be subdivided and half of it topdressed annually with 1 cwt of superphosphate and the other half with 3 cwt of superphosphate. Each year a portion of these two paddocks will be ploughed and sown to swedes for wintering the trial ewes from the two fertiliser treatments.

Farmers have a problem in deciding the economic rate of application of fertiliser in relation to increased livestock production. This trial should provide some factual information on which a decision can be based.

Tobacco Research Station

Control of Verticillium Wilt

Verticillium wilt is becoming a serious disease of tobacco growing. Recent work has shown that it can be controlled on a field scale by the use of chloropicrin. A tractor-mounted applicator was used, consisting of supply tank, pump, relief valve, and plastic distribution tubes leading to five cultivator tines spaced 1 ft apart. The chloropicrin was applied at the rate of 3 c.c. per square foot, which is equal to 35 gallons per acre, the quantity being controlled by pump pressure and suitable sized orifice plates in the feed lines. Injection was continuous at a depth of 6 to 8 in. Polythene tubing was superior to polyvinyl.

Immediately after treatment at least ½ in. of water was applied as a seal by means of an irrigation plant. This was essential for the success of the operation. Treatment must be carried out at least three weeks before planting, and all subsequent cultivation should be shallower than the original depth of treatment.

Care of Livestock during February

By Wallaceville and Ruakura Animal Research Stations

MANAGEMENT OF EWE FLOCK AT MATING

MANAGEMENT of the ewe flock just before and during mating sets the maximum lambing percentage of the flock. All subsequent management merely aims at harvesting, as lambs, the greatest proportion of the eggs shed by the ewes in response to their pre-mating treatment.

Fly-crutch the ewes and three weeks before they join the rams flush them for six weeks on the best feed available. Experiments show that this flushing increases the number of lambs marked by 20 per cent.

TWO-TOOTHS

Recent research at Ruakura shows that two-tooth ewes require special treatment at mating. Shearing just before joining increases the number of ewes lambing by up to 17 per cent. Again ewes of this age do not remain on heat as long as mature sheep and they do not accept service from the ram as readily. Unless adequate precautions are therefore taken, many fail to get in lamb simply because they are not mated. To overcome this problem mate two-tooth ewes separately from the main mob, preferably in small paddocks of easy contour, and mob them up once or twice daily during tupping.

MATING RECORDS

Ram harness and crayons are now available for marking ewes as they are tupped. If these are used during the first two to three weeks of the mating period, most of those early ewes, which will lamb before the main bulk of the lambs come with a rush, could be picked out. If they are used again toward the end of tupping, ewes lambing after the main rush and those which are likely to be dry could be identified. With mating records such as these the ewe flock could be divided up accurately for differential feeding during winter and consequently more ewes could be carried with safety.

TIME OF MATING EWES

In New Zealand the breeding season of Romney ewes normally begins in late February and ends in July. From quite a number of investigations it is evident that as the breeding season advances the average number of eggs shed by the ewe at successive heats rises to a maximum and then declines. For this reason delaying the time of joining until about the beginning of May could increase lambing percentages considerably. However, to fatten lambs successfully on grass they should be born, ideally, four to six weeks before the onset of spring growth. Time of mating therefore must be related to the seasonal pattern of pasture growth in each particular district.

SOWS AND WEANERS

Ruakura research has shown that it is an inefficient practice to allow sows to lose condition during suckling. A sow fed 4½ gallons of separated milk for herself plus 1 gallon for each pig suckled will wean in good condition. After weaning feed the sow 4 gallons of separated milk plus good-quality grass until she is successfully mated. The ration can then be reduced to 2 gallons per day plus grass.

To use the separated milk available efficiently it is important to mate approximately 40 per cent of the sow herd during February. These will then farrow in May and their litters will be large enough to cope with the seasonal flush of milk in October-November. At weaning feed the pigs 1½ gallons of milk plus ½ lb of meal daily. As the pigs grow, gradually increase the milk fed and reduce the meal so that at one month after weaning the ration consists entirely of separated milk.

COBALT DEFICIENCY

Bush sickness can be completely prevented by topdressing annually with cobaltised superphosphate, and in the North Island at least this is best applied in the annual autumn topdressing. Cobaltised superphosphate prepared in North Island works contains 3 lb of cobalt sulphate per ton. Two hundredweight of this fertiliser contains sufficient cobalt for 1 acre. In the South Island cobaltised superphosphate contains 6 lb of cobalt sulphate per ton, and 1 cwt of this contains sufficient cobalt for 1 acre. If greater quantities of fertiliser than those indicated above are used, the additional amount need not be cobaltised.

COPPER DEFICIENCY

Scouring in cattle and staggering in lambs grazing on peat and other copper-deficient land can be prevented by topdressing the pastures in autumn with 5 lb of bluestone per acre. Copperised superphosphate is available, or the bluestone may be mixed with lime. For fuller particulars the Department's Bulletin No. 238, "Copper Deficiency in Cattle and Sheep", should be consulted. Where topdressing is not practical injections of copper cerate can be used.

PULLORUM DISEASE IN POULTRY

Preparations should now be made for the autumn hatch by blood-testing the flock for pullorum disease and by cleaning and fumigating the incubators. A vacuum cleaner is ideal for cleaning, and advice on fumigation may be obtained from the local Poultry Instructor of the Department of Agriculture.

CARE OF CALVES

Autumn is a critical period for calves. Deaths during winter can be eliminated by rotating dairy calves through the paddocks ahead of the cows at intervals of three or four days. If this is not being done, it should be begun immediately. Calves so treated will be up to 100 lb heavier as yearlings than those confined in a calf paddock. Early weaned beef calves on hill country should be given the pick of pastures ahead of other stock. If calves are unthrifty and scouring, it may be necessary to give two or three doses of phenothiazine at three-weekly intervals, but this is seldom necessary with calves which are rotationally grazed.

VITAMIN A FOR GROWING AND LAYING BIRDS

Vitamin A is essential to poultry for protection against various infections, particularly colds and contagious catarrh. Poor egg production is a common feature of an inadequate supply of vitamin A to laying birds.

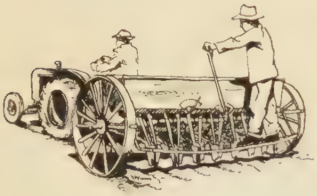
Green feed is a useful source, but at certain periods of the year when this becomes scarce or poor in quality it may be of little value. When good-quality green feed is not available, the addition of one of the several vitamin A-rich productions on the market such as synthetic vitamin concentrate powder, emulsion, or fish oil is advisable for laying pullets. The amounts used vary according to the product selected and the age of the birds to be fed. The quantity advised by the manufacturer of the product should always be used when adding a vitamin supplement to the diet.

Further advice on the use of vitamin A supplements may be obtained from the local Poultry Instructor of the Department of Agriculture, and a special leaflet on the subject is available.

Seasonal Notes

By Farm Advisory Division

CEREALS FOR WINTER GREEN FEED IN NORTH ISLAND



IN the central districts of the North Island the crops most commonly grown for winter feed are swedes and chou moellier, but the cereal green feeds have a place and certain definite advantages. They are a safer first crop when old grass is ploughed, as they will tolerate a rougher seedbed than the brassicas, they can be sown later in the season with more certainty of a winter crop, and when they are being fed off the sheep are not constantly wet as they are in a crop of chou moellier during winter.

For all autumn-sown cereals the land should be ploughed well in advance and the old turf well buried. The seedbed should be firm, but not too fine; a cloddy seedbed is preferable to prevent crust formation under winter rain and frost.

Sowing to 2 to 3 cwt of superphosphate with the seed is advisable, but when old pasture of low fertility is being broken up the limiting factor to a good green feed crop is likely to be nitrogen. In such sowings 1½ cwt of sulphate of ammonia in addition to the phosphate will ensure vigorous growth before cold weather comes and will prevent the unthrifty, yellow appearance associated with nitrogen deficiency.

The choice of varieties will depend on the time the feed is required. For late autumn and early winter both Black Skinless and Cape barley, sown at 2 to 2½ bushels in March or April, are high producers under good conditions. Winter Grey oats do well on the poorer soils, while Algerian oats make a good recovery from early grazing for late winter feed.

For long-term production, that is, for late winter and early spring feeding, the best crops are Wong barley and C.R.D. ryecorn. Wong barley makes excellent recovery from early grazing and provides a heavy crop for early spring feed, but needs a good seedbed on fertile soil. On the poorer soils and under the hardest winter conditions ryecorn is likely to prove superior to either oats or barley.

—*A. D. MERCER, Wanganui*

* * *

RENOVATING SUBTERRANEAN CLOVER PASTURES

FOR high production farmers on light land in low- or medium-rainfall districts depend largely on vigorous subterranean clover pastures. As these pastures age they become deficient in good grasses, the subterranean clover becomes crowded and less vigorous, and production from the pasture declines. The phenomenal growth on this country after autumn rains of newly sown grasses and cereals can be utilised cheaply and with minimum work by the technique of pasture renovation. Since treatment is confined to autumn, carrying capacity is not reduced during the important part of the season—spring and early summer.

Such pastures should be grubbed three or four times to a depth of 1 or 2 in. in late January or early February. Where subterranean clover seed is very thick some should be allowed to germinate and then be killed by subsequent harrowing. One bushel of grass seed should be drilled into the prepared seedbed, after rolling, with 1 cwt of superphosphate.

Though perennial ryegrass is most commonly used, short-rotation ryegrass or a mixture of the two is quite satisfactory. Half a bushel of oats or 3 oz of quick-growing turnips can be added to obtain a greater bulk of winter feed. This treatment, followed by annual topdressing, will rejuvenate a paddock for three years or more.

The importance of pest control must not be ignored. The renovation should be completed by the broadcasting of 1 cwt per acre of extra-strength DDT superphosphate containing 2 lb p.p.i. DDT.

—*C. P. WHATMAN, Ashburton*

* * *

LIGHT LAND PASTURE SOWINGS

THE sowing of pastures on light land is best done toward the end of January or in February after a summer fallow. Ground which has been worked right through until sowing will be well compacted and a good kill of weeds will have been obtained. Even in a dry season moisture is usually sufficient to germinate the seeds and carry them through until the autumn rains. Growth of pastures after a fallow will invariably continue right through winter to be available for ewes for the early lambing which is usually practised on this type of country.

For many years subterranean clover has played an important part on the light land farm. If it is to be sown on country for the first time, 3 to 4 lb per acre should be included in a mixture of a bushel of perennial ryegrass and 2 lb each of crested dogstail and white clover. Where subterranean clover has previously been sown 1 or 2 lb will be all that is needed in a mixture, as there will be plenty of seed in the ground.

Cocksfoot and red clover are very useful additions to pasture mixtures for the excellent growth they make in autumn, when ryegrass and white clover are dormant. About 8 lb of cocksfoot and 4 lb of red clover would be included in a mixture with 10 lb of perennial ryegrass and 1 lb of white clover.

Lucerne sown either alone or with cocksfoot at rates of 12 lb and 3 lb per acre respectively has become more popular on light land over the past few years. Lucerne growth starts early in spring and with the cocksfoot continues through all but the driest of summers. The feed is palatable and as such a pasture is unaffected by grass grub after establishment, many years of useful grazing should be obtained.

Opinions on mixtures and rates of seeding vary and most farmers will stick to the one which best suits their soil and system of management. However, no pasture will last long without regular topdressing with superphosphate and occasional treatment with DDT.

An application of DDT at sowing down is also advisable. This will ensure that the pasture is not thinned out initially by grass-grub damage. Liming, too, is an important factor and most new pastures need at least maintenance dressings of lime.

—*A. J. EBERT, Christchurch*

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Vegetable Growing for *HOME and MARKET GARDENERS*

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

Cauliflowers and Broccoli

CAULIFLOWERS are a very important vegetable crop in New Zealand. They are widely grown in all the major vegetable producing districts and for many growers of mixed vegetables they are the most important crop. The broccoli or winter cauliflower does not differ botanically from the cauliflower grown for summer use except that most strains of the former are hardier and the leaves encircle and protect the curd more effectively. Both are classified as *Brassica oleracea botrytis*. Varieties of winter cauliflower (broccoli) and cauliflower grown for summer use vary considerably in hardiness, and the choice of a variety suited to local conditions is an important factor in successful production.

CAULIFLOWERS thrive best in cool, moist climates. They can be grown throughout the year, but in the warmer parts of New Zealand fewer cauliflowers are grown in the warm months than in the cold months. In this article the word cauliflower refers to both winter cauliflower (broccoli) and summer cauliflower.

Soil and Manure

Soil for cauliflowers must be well drained yet retain moisture. It must be well supplied with plant foods and humus or decayed organic matter. Lighter soils that warm up readily are preferred for early crops. Adequate moisture and nitrogen are specially important, as deficiency may result in buttoning or failure of the curd to develop beyond a very small size. Deficiency in moisture and nitrogen has specially to be guarded against in crops set out in late summer or early autumn, after the ploughing in of a green crop or considerable unrotted residues of other crops which have recently been harvested.

As with most other vegetables fertiliser practices vary considerably in different districts. Trials in the Levin district in which blood and bone were applied at respectively 10 cwt and 1 ton per acre and comparable inorganic fertiliser at 10 cwt, 20 cwt, and 30 cwt per acre indicated that under the conditions of the trials crops improved in direct ratio to the nutritional value of the fertiliser given. No difference was noticed between responses from organic or inorganic fertilisers.

Heavy applications of blood and bone are favoured by both Chinese and European growers. Blood and bone at a ton per acre is preferred by many Chinese growers, though European growers usually apply less blood and bone but supplement their base fertiliser dressing with sulphate of ammonia, superphosphate, and sulphate or muriate of potash. In addition it is the practice in some districts to apply to the growing crop side dressings of sulphate of ammonia or another nitrogenous fertiliser. Successful growers everywhere stress the importance of keeping the ground in first class condition by green cropping, proper rotations, and the addition where available of animal manure or a similar good organic material.

Sowing

Cauliflower seed is sometimes drilled in the rows where the plants are to mature, the plants being thinned as soon as they are large enough, but usually the plants are raised in a seedbed where the seed may be drilled ½ in. to ¾ in. deep at the rate of about 30 seeds to the foot in rows 9 in. to 1 ft apart or they may be broadcast thinly on beds about 3 ft wide. According to temperature and growing conditions, seed is usually sown five to seven weeks before the plants are to be set out.

The seedbed soil should be only moderately rich, because in too rich soil the plants tend to become too

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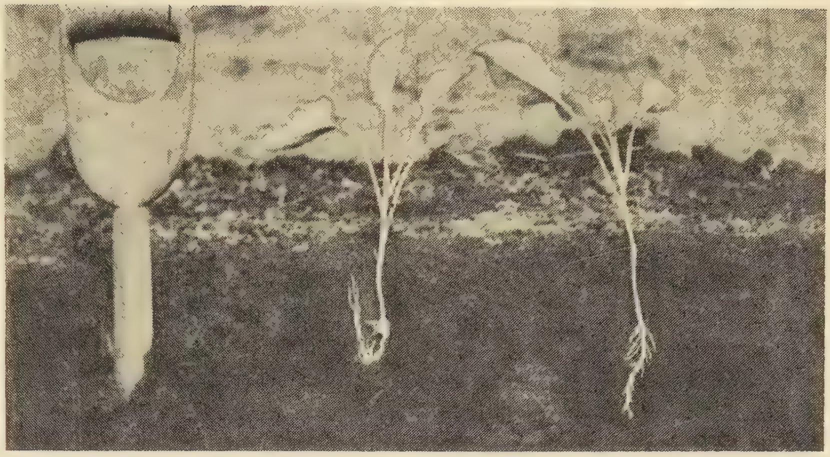
spindly and soft and they do not transplant as well as stocky plants that have been grown more steadily under more balanced conditions. Plants that have become stunted or checked owing to poor or dry soil may head prematurely, and water or manure should be applied if conditions warrant it. Winter cauliflower (broccoli) will withstand adverse conditions during and after transplanting better than the more sensitive summer types, which should be set out before they are too large and should in other respects be given favourable conditions of moisture and nutriment.

In many districts seedbeds are treated with molybdenum to ensure that deficiency symptoms do not develop, and in some soils the plants are able to take up enough molybdenum in the seedbed to prevent deficiency symptoms from developing later. Many growers also treat seed before sowing with TMTD (thiram) or a similar fungicide as a protection against disease.

Planting out

Commercial growers prefer to plant out larger plants than do home gardeners, but it is a mistake, particularly with summer cauliflowers, to choose plants that are too large. Broccoli plants larger than summer cauliflower plants will usually succeed, but if plants are too large, the crop may fail.



Cauliflower seedlings should be planted so that the roots can hang down as shown at right and not be cramped and bent upward as at left.

The seedbed should be well watered before plants are lifted and only the best plants should be used for transplanting. Some growers dip the foliage in insecticide before planting and many trim the tops off the leaves to reduce transpiration when the plants are being set out under hot conditions and also water the plants in.

Plants are usually spaced 18 in. to 20 in. apart in rows 26 to 30 in. apart, but some growers prefer planting on what is known as the square, plants being set about 30 in. apart both ways, which enables mechanical cultivation to be carried out in both directions. Plants are usually set out on ridges in areas where the soil tends to lie cold and wet.

Harvesting

Heads of cauliflower do not develop uniformly and growers usually go through their crops every two or three days as the plants approach maturity and bend a leaf or two over to protect

CAULIFLOWER VARIETIES GROWN IN DIFFERENT DISTRICTS

Varieties Listed by Instructors	Auckland	Pukekohe	Hamilton	Ohakune	Palmerston North-Manawatu	Hawke's Bay	Nelson	Christchurch	Oamaru	Dunedin	Planted	Harvested
All Year Round	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	June-Jan.	Sept.-March
Phenomenal 3 months ..	☆	☆	☆	☆	☆	☆		☆		☆	Nov.-Jan.	Feb.-April
Phenomenal 4	☆	☆	☆	☆	☆	☆	☆	☆			Jan.-April	April-June
Phenomenal 5 + Y5	☆	☆	☆	☆	☆	☆	☆	☆		☆	Jan.-Feb.	May-Aug.
Phenomenal 6 (main crop) ..	☆	☆	☆		☆	☆	☆	☆	☆	☆	Jan.-Feb.	May-Aug.
Australian XXXX	☆	☆	☆	☆	☆						Jan.-Feb.	May-July
Snowball	☆		☆		☆	☆		☆			July-Jan.	Oct.-March
Hawkesbury	☆										Jan.-March	April-Aug.
White Nugget (4 months) ..	☆	☆				☆					Jan.-March	April-Aug.
Besants Heatherington Strain	☆										March-April	Aug.-Sept.
Snow White (4½ months) ..		☆		☆							Nov.-Dec.	March-April
Perfection (5 months) ..		☆										
Roscoff Varieties			?							☆	April	Oct.-Dec.
Early London			☆		☆	☆					July-Dec.	Oct.-March
Le Cerf			☆									
Hancock						☆					February	May-June
Perfected Deep Heart ..						☆					February	May-June
Calabrese (sprouting broccoli)						☆						
Snow White					☆		☆	☆	☆	☆	Dec.-Jan.	Aug.-Sept.
Autumn Giant									☆	☆	Dec.-Jan.	June
American No's 1, 2, 3, 4, 6				No. 1	☆		☆	☆	☆	☆	Dec.-Jan.	May-Oct.
June Queen							☆		☆	☆	Dec.-Jan.	June
White Beauty									☆		Dec.-Jan.	July-Aug.
Superb Early White							☆	☆	☆	☆	Dec.-Jan.	Aug.-Sept.
Suttons Whitsuntide									☆		Dec.-Jan.	Sept.-Oct.
Satisfaction							☆	☆	☆	☆	Dec.-Jan.	Sept.-Oct.
July Queen							☆				January	July
Winter Mammoth							☆			☆	Dec.-Jan.	June
Triumph							☆			☆	January	June-July
Winter White							☆				January	September
Penzance								☆			January	Sept.-Oct.
Late Queen								☆		☆	January	Sept.-Oct.
Latest of All									☆	☆	Dec.-Jan.	Sept.-Oct.

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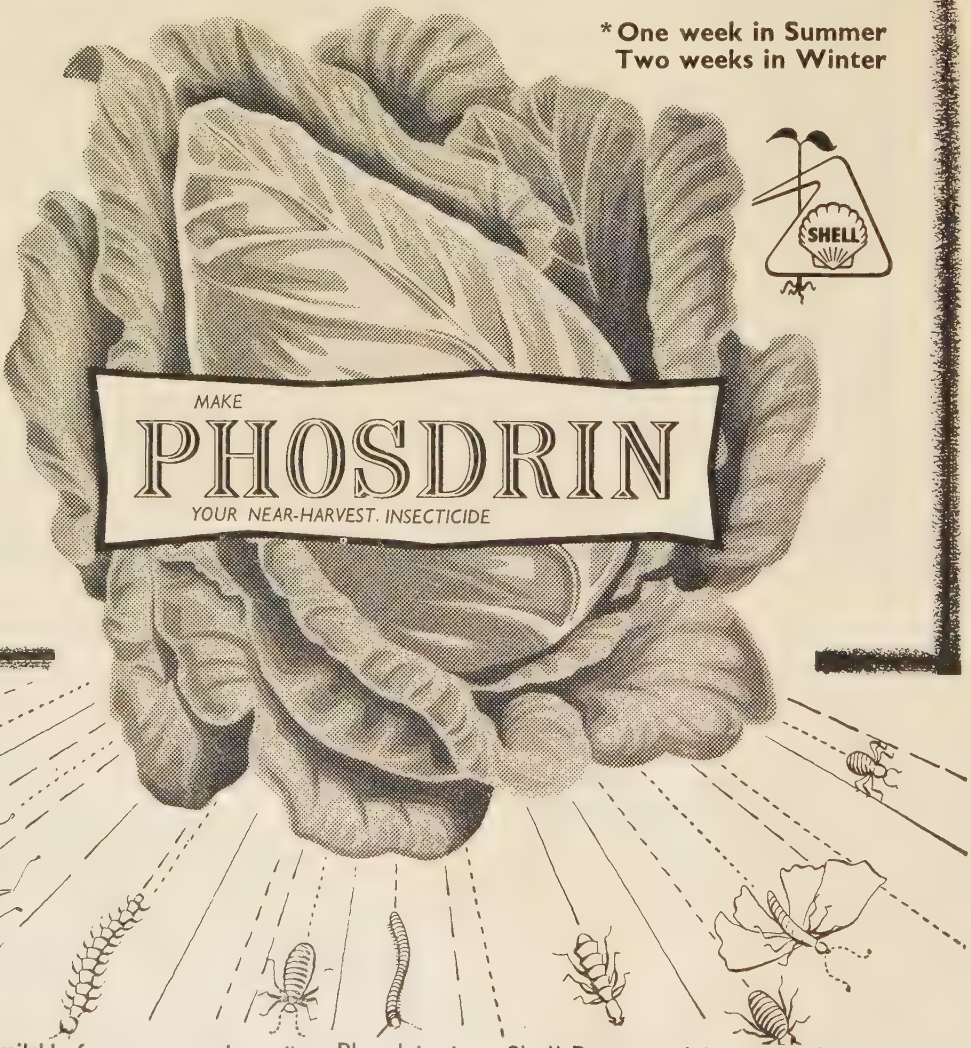

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the developing curds from the sun or from frost damage. Heads are cut just before they are fully developed. If they are left too long, the flower stalks elongate and loose, ricy or fuzzy heads result. The longer the heads are left after reaching their prime condition for cutting, the sooner they wilt after harvest. Cutting is commonly done with a heavy, sharp knife and the heads are then trimmed of superfluous leaves and put into sacks or large boxes such as banana cases. Cauliflower heads are easily damaged and have to be packed carefully to avoid damage while being packed and damage through rubbing in the containers in transit.

Varieties

The table on page 41 does not show all the varieties grown in the different districts, as numerous other varieties are grown. Some of the varietal names are synonyms, and for a particular district or period the selection of a good strain of cauliflower is often more important than the choice of the variety, because strains of varieties may vary considerably. Many growers grow their own seed because they have selected a particular strain or strains which they regard very highly.

Some of the more important varieties are described here:

All Year Round is an early type of which there are many strains. The best are well suited to successional planting and early cutting. Good strains are dwarf and have thin stems and large curds with wide, fairly short leaves.

All Seasons is somewhat similar and frequently listed under the name All Year Round, but it is a distinct variety and good strains are of fine quality.

Early London is not much grown. The best strains are of compact growth with good heads of medium size.

Snowball is a strain of the old variety Early Snowball. It is a dwarf, slender-stemmed variety with a medium-sized head. The varieties Hawkesbury Solid White and White Nugget are probably synonymous.

Le Cerf is similar in many characters to some of the Snowball strains and is suitable for early cutting. The head is moderate in size with a white, solid curd surrounded by semi-protecting wide, short leaves. The best strains are very good.

Veitches (Autumn Protecting) is a plant of average vigour with a round, white, firm curd and overlapping leaves to give protection against frosts.

June Queen is grown for cutting in May-June. It is dwarf growing with large, white, well protected heads.

American Types Nos. 1, 2, 3, 4, and 6 can be grown to mature successionally from June to October. Good strains

[Green and Hahn

In home gardens it is a good idea to bend over the leaves of cauliflowers to protect the heads.

▼ For commercial crops there are a number of varieties which have good, well protected heads.

[Green and Hahn

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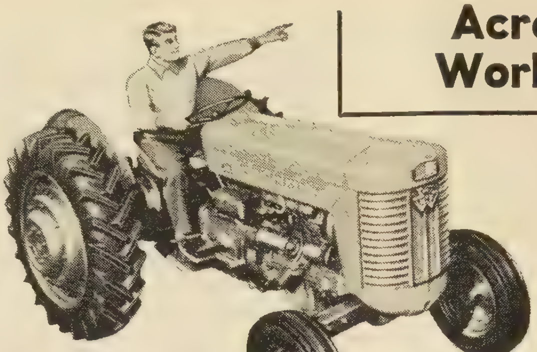

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are vigorous and well protected and have good heads. They are popular in southern districts particularly. Many growers have developed their own strains, particularly for harvesting in August-September.

Roscoff strains are French cauliflowers available in several maturity periods from June until October. They are not widely grown, but the best strains produce quality heads well protected from all but the most severe conditions. The late varieties occupy the ground too long for many growers.

Phenomenal, 3 months, 4 months, 5 months, and 6 months are widely grown. In southern districts they are used mainly as summer and autumn cauliflowers. They are available in strains to mature successionally, though in most districts growers tend to grow only one or two varieties which suit their programmes.

Winter Mammoth was formerly considered to be one of the hardiest, most reliable, and best winter cauliflowers or broccoli, but generally reports are now less favourable and it is probable that the strain now available differs from that available before the war.

Satisfaction is a fairly strong grower classified in the cauliflower-broccoli group. The curd is very white and solid and lasts well and the leaves are semi-clasping and slightly protecting. It is generally grown for late cutting.

Seed Saving

The importance of good seed is recognised by all experienced cauliflower growers and some growers in most districts grow their own seed. Seed stored under good conditions retains its vitality for several years, and experienced growers who grow their own seed usually plant only a small area of a variety the first season after saving it to determine its quality, and thereafter use it as required if this small-scale trial proves that it is satisfactory.

Because cauliflowers are susceptible to inclement seasonal and soil conditions and because many agronomic factors such as vigour, season at maturity, type and quality of curd, and habit of growth are affected by environmental and hereditary influences, selection of good strains of cauliflower is not simple.

As cauliflowers are cross pollinated, the dangers of contamination by foreign pollen during the flowering season are very high.

Therefore maintenance of quality in cauliflower varieties produced by growers calls for careful selection during the time the mature leaves form and the curd develops. Experience is essential in the selection of the most desirable type, which should have a dwarf stump or stem and leaf blade firmly clasping the stem without too pronounced whorling. The curd should be solid and of fine texture, white and without woolliness.

Isolation is important in seed production, as cauliflower (and broccoli) is pollinated freely by brussels sprouts and cabbage, and if any of these crops are growing within several hundred yards of cauliflower seed crops and are developing flowers, they should be destroyed. Developing cauliflower seed crops have to be rogued to eliminate undesirable types at about 10-day intervals.

Important Pests and Diseases

Mildew and Leaf-eating Pests

Downy mildew usually appears first on the seed leaves. White downy patches develop on the under surfaces of the leaves, causing stunting and wilting; foliage may become yellow. Where infection is severe seedlings may be killed and mature plants may be made susceptible to destruction by soft-rotting organisms.

Control consists of ensuring that ventilation, spacing, and drainage are good and spraying with copper oxychloride. Where caterpillars, cutworms, vegetable weevils, and thrips are troublesome a spray made up of 5 lb of copper oxychloride, 1 lb of 50 per cent DDT, and 1 gallon of summer oil to 100 gallons of water may be used. The use of a systemic insecticide is advisable where aphids are present and virus diseases are in adjacent crops.

Clubroot

Clubroot affects all members of the cabbage family including rape, swede, radish, and mustard and also some ornamental cruciferous plants such as wallflower, stock, and candytuft and weeds such as charlock and shepherd's purse. The disease is caused by a fungus which enters the root system from the soil. Rounded or knobbly swellings develop and eventually decay in a smelly soft rot. The failure of the root system stops growth and in severe attacks the plants die, but where infection is not serious the plants may produce a curd or may survive, but will wilt in hot weather, according to the degree of infection.

The disease can be controlled in most soils by heavy liming, but for this the lime must be in intimate contact with the soil particles, and the application will not usually show results for some time. In some soils liming does not control the disease and the seedbeds must be treated with a 0.1 per cent acidulated mercuric chloride solution. Four gallons of the solution should be applied to 2 sq. yd. of seedbed through the sprinkler of a watering can and the bed should be left for 10 days before sowing. To assist penetration of the seedbed a gallon of water can be applied about an hour after the treatment.

For control in the field, apart from the application of lime, crop rotation (with as long a period as possible between cruciferous crops) should be practised. Satisfactory results are also obtained by applying $\frac{3}{4}$ to 1 pint of a solution of acidulated mercuric chloride (1 : 1,500) in the dibble holes several days before planting out or by dipping roots of seedling plants into a slurry of calomel and mud before planting out.

Molybdenum Deficiency (Whiptail)

Cauliflower is the vegetable crop most sensitive to molybdenum deficiency. In this disease, which is commonly known as whiptail, the midrib and main veins on all or some leaves are shortened and the leaf blade may be undeveloped or straplike, puckered, and brittle, according to the severity of the disease. Only a few outer leaves may be formed and the curd may be undeveloped or have leaves growing through it. The growing point may be atrophied and numerous side shoots may have developed. Seriously affected cauliflowers do not produce a curd.

The disease is usually associated with highly acid soils and the trouble can sometimes be controlled by liming, but if the molybdenum content of the soil is very low, the trouble is likely to develop even in alkaline soils.

Whiptail is a widespread trouble in New Zealand and occurs in many soils in both the North and South Islands. Considerable research has been done on it by both the Plant Diseases Division of the Department of Scientific and Industrial Research and the Department of Agriculture, and recently the Horticulture Division collated available information on it and made a survey of its incidence in the different vegetable growing districts.

The disease can be reduced in cauliflower by dressings of $1\frac{1}{2}$ to 3 lb of sodium molybdate per acre; by $\frac{1}{2}$ lb of ammonium molybdate per 100 gallons of water applied with pest or disease control materials; by seedbed applications of 1 oz of sodium molybdate in 3 gallons of water, or by 1 oz of ammonium molybdate to 10 sq. yd. of seedbed.

Cauliflower Mosaic

Cauliflower mosaic virus is one of the most serious diseases of cauliflowers in New Zealand. It can affect plants in all stages of growth, but it is most serious in young plants. The

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disease shows up two or three weeks after infection as a lightening in colour along the veins of young leaves.

This is termed vein clearing and may persist as leaves age, but it is usually replaced by dark green bands of tissue next to the veins, termed vein banding. In the areas between the veins pale green spots, rings, or line patterns soon appear. Portions of the leaf between the veins may later become yellowed, and on mature leaves dead patches or spots may develop on this yellowed tissue.

Symptoms are often more pronounced on one half of the leaf, causing the blade to develop unevenly and become bent over to one side. Infected plants are usually stunted, especially when infected while very young. Central leaves remain small and tend to be upright, leaving the heads exposed. The heads are often poor in shape and usually too small for marketing. Symptoms are similar in cabbage, chou moellier, swede, and rape.

The disease is commonly spread by the grey cabbage aphid (*Brevicoryne brassicae*), though it may also be spread by other aphids. Host plants which may act as reservoirs of infection and so help carry the disease over from one season to another include weeds, such as hedge mustard, and brassica seed crops. It is very important to isolate seedbeds from possible sources of infection.

In a trial laid down at Lincoln in 1958 by H. G. Smith, of the Plant Diseases Division, Department of Scientific and Industrial Research, and H. J. Giesen, of Crop Research Division of the same Department, it was shown that though infection with the virus could not be prevented, the infection was delayed by spraying the plants in the seedbed with a suitable insecticide at regular intervals. This delay in infection resulted in a much higher percentage of marketable curds and a considerable gain in the average weight per curd. The early spraying of cauliflower seedlings with a systemic insecticide followed by a normal spraying programme after transplanting is an economical proposition, and will certainly appeal to any commercial grower who is troubled with this aphid-borne disease.

Boron Deficiency

Lack of boron can result in stunting and malformation of the leaves immediately around the curd, reduction in size of the curd, and brown, water-soaked stains on the surface of the curd. Brown areas occur inside the curd branches or more commonly in the main stem, where hollowing may occur. The trouble is often followed by soft rots caused by other agencies.

Borax at from 10 to 20 lb per acre applied mixed with other fertilisers will correct the trouble.

Leaf Spots

Leaf spots may be due to any of several diseases and are likely to be most troublesome in winter, late autumn, and early spring. Control consists of adequate spacing, balanced manuring, rotation of crops, destruction of rubbish, and in the more serious cases spraying with copper oxychloride.

Black Rot

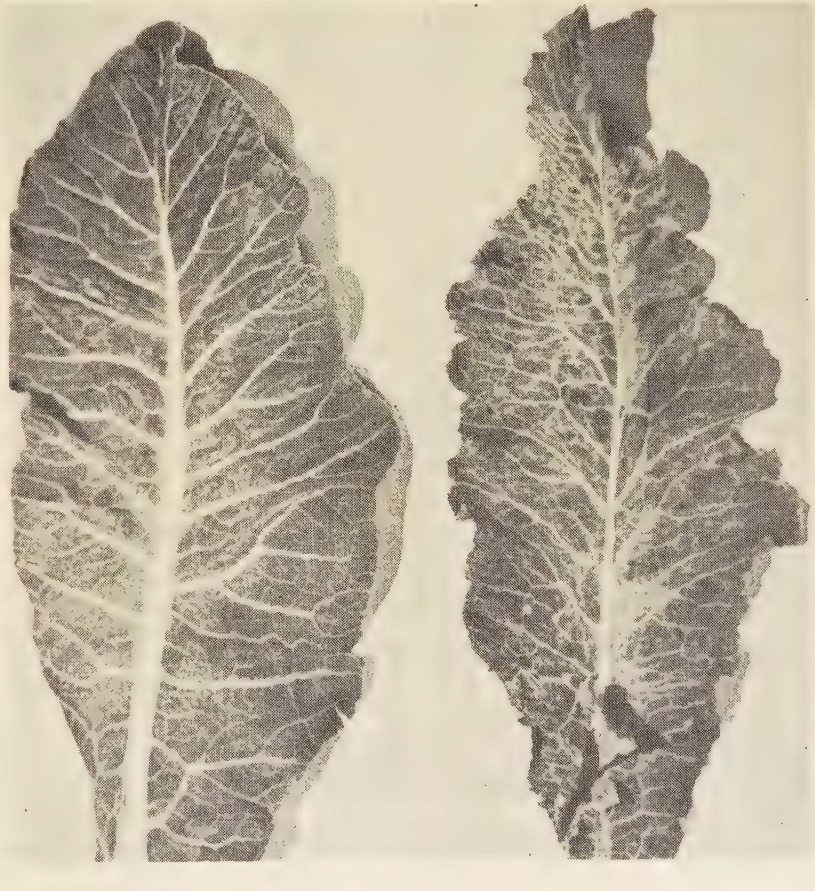
Black rot is occasionally troublesome in some districts. It shows as a yellowing of the leaves, usually beginning at the tips, and a blackening of the veins. Cutting across the stalks will show a characteristic black ring which is caused by the bacteria in the water-conducting strands. Affected plants stop growing or are seriously checked and may be invaded by secondary rots. The disease is nearly always seed-borne and seed should be treated before use.

Hot-water Treatment

Treatment with hot water is the most effective way to ensure that seed is free of the black rot organism, but the treatment may greatly reduce germination of the seed. Essential for the treatment is a container with a heating element that can keep the temperature of the water to within ½ degree of the recommended temperature.

The seed is first soaked for five to six hours in water at 50 to 60 degrees F to saturate it and make it more susceptible to temperature changes. It is then put into the container with the hot water and is soaked for 10 minutes at a temperature of 130 degrees F. **This temperature must be maintained, and an accurate, tested thermometer is essential.** The seed must be constantly agitated.

The seed is cooled immediately by immersion in cold water and is then drained and dried.



The cauliflower leaf at left is healthy, but that at right has been attacked by cauliflower mosaic, one of the most serious diseases of cauliflowers in New Zealand.

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February Work in the Home Garden

By A. G. KENNELLY

THE vegetables that can be sown for succession in February are limited to those which will mature before winter or which can be relied on to over-winter and mature in early spring. These vary according to district, but in all except the mildest districts winter greens such as cabbage, winter cauliflower or broccoli, brussels sprouts, and leeks should be planted without delay if the work has not yet been done. February is a rewarding month in the well planned garden, as half-hardy and tender crops should be available as well as a wide range of hardy vegetables.

APART from sowing and planting vegetables which will develop during favourable autumn weather, the most important job in most gardens is to destroy weeds, which, if left, will suppress all but the most vigorous or mature crop plants. Many weeds produce seed in February and reinfestations from this source may be troublesome throughout the year. Many weeds are alternative hosts for vegetable pests and diseases and help to carry them over from one season to the next.

The aims of the efficient gardener should be continuity of supply, within the limits set by the size of the garden, with special emphasis on having crops in bearing when vegetables are usually scarce and dear, together with the maintenance of good soil texture, consistently heavy yield of quality produce, tidiness, and freedom from pests and diseases.

Though there are some variations according to district and situation, there are usually only four good growing months after Christmas. Because garden work is often disrupted by the Christmas and New Year holidays, many gardens are neglected during the greater part of January, and important work is delayed until February. This loss of one of the best growing months may seriously reduce the period for good growth in most southern districts, particularly of winter greens such as leeks, savoy cabbage, winter cauliflower (broccoli), kale, brussels sprouts, and silver beet.

Control of Aphids

Aphids or green flies are among the most troublesome garden pests, but they can be controlled by spraying with lindane. The grey aphid is specially troublesome to the cabbage family, as it not only distorts growth and makes vegetables such as brussels sprouts difficult to clean, but spreads virus. On young, developing crops that are not to be harvested for a considerable time the grey aphid is best controlled by spraying with a systemic insecticide.

Sowing and Planting in Brief

Sow:

Cress Endive Lettuce Mustard Peas Radish Salad onions Spinach Silver beet Turnips	Where soil conditions are good and the weather is likely to remain favourable until plants mature
Cabbage Cauliflower	In most districts, for spring use
Carrots Dwarf beans Beetroot	In favourable situations

Plant:

Brussels sprouts
Kale
Leeks
Savoy cabbage
Silver beet
Winter cauliflower (broccoli)

Crop Management

Celery is often troubled with leaf spots at this time of the year. These can be controlled by regular spraying with copper oxychloride, zineb, or captan. Celery and celeriac should be kept well supplied with moisture. Celery plants can be set out in favourable situations. Brassica crops should be sprayed with DDT to kill caterpillars or with lindane if aphids are also present. Lindane should not be applied within seven days of harvest and DDT within 14 days of harvest, because of the risk of poisonous residues. In many districts tomatoes and potatoes will have to be sprayed or dusted with DDT or lindane against caterpillar infestation and with bordeaux mixture, copper oxychloride, or other certified spray material against fungous diseases.

Though in northern districts or in sheltered situations spring cabbage can be grown from seeds sown in March, elsewhere February is the month preferred for sowing. Where soil and situation are not good seed should be sown as soon after the end of January as possible.

Readiness of onions for harvesting is indicated by drooping of the tops just above the bulbs when the leaves are still green. Gradual dying back from the tips of the leaves while the necks remain rigid, erect, and thick is an indication of abnormal ripening and usually of poor keeping quality.

Correct harvesting and curing are very important if onions are to be stored for a considerable time. Drying or curing usually takes three to four weeks. In the low rainfall districts where a spell of fine weather in autumn is likely bulbs can be left on the ground. The tops should be left on to give them some protection from the sun. If rain falls or there are heavy dews, the bulbs should be turned to enable them to dry evenly and to check rot, sprouting, or discolouration by the wet soil.

Garden peas can still be sown where conditions are favourable, but in most southern districts it is rather late even in early February to sow peas to mature before winter. An early or quick maturing variety should be chosen.

Parsley can be sown in February to ensure continuity of supply. The soil should be fertile and moist, as otherwise germination and growth are likely to be slow. It is desirable that the parsley should make good growth before winter to provide supplies through that season.

Vacant land should be sown with a green crop to keep the soil in good condition. Lupins, barley, mustard, oats, maize, peas, or even beans can be used if seed is available. All these crops will make fibre which can later be dug in to provide organic matter which will improve the tilth of the soil.

If crops require water, it should be given generously rather than sparingly, as light waterings tend to bring the roots to the surface, where they are likely to die later if conditions remain dry. Mulches of organic matter are usually better than light irrigations, and black plastic pegged down between row crops has given good results in retaining moisture.

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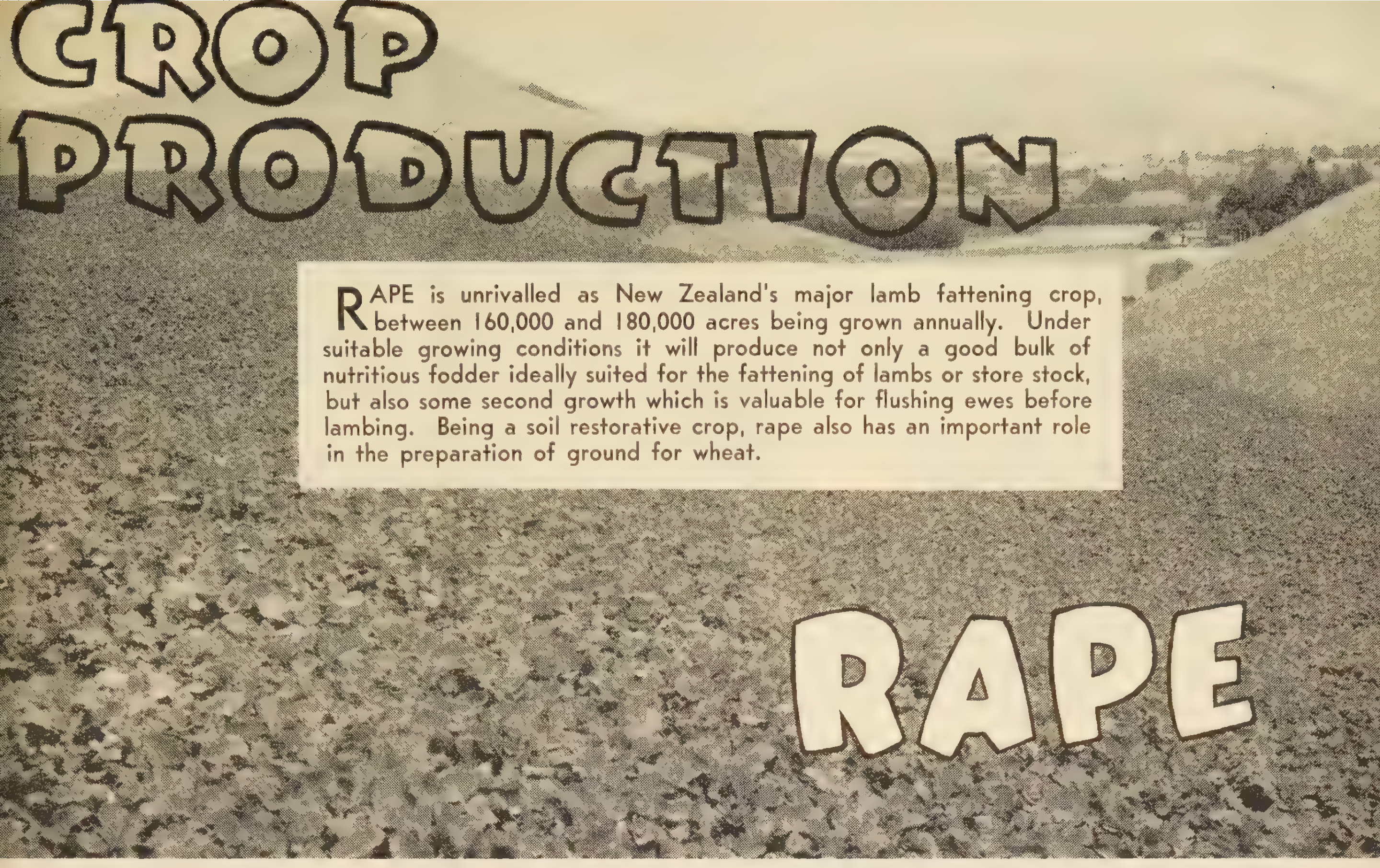
CROP PRODUCTION

RAPE



RAPE is unrivalled as New Zealand's major lamb fattening crop, between 160,000 and 180,000 acres being grown annually. Under suitable growing conditions it will produce not only a good bulk of nutritious fodder ideally suited for the fattening of lambs or store stock, but also some second growth which is valuable for flushing ewes before lambing. Being a soil restorative crop, rape also has an important role in the preparation of ground for wheat.

THE growing of rape is closely bound up with farming systems and climate. It is seldom grown where lambs can be fattened off the mothers or where the climate allows specially saved pastures to be available after weaning, and this applies to much of the North Island. Thus by far the greatest acreage of rape is grown in the arable farming areas of Hawke's Bay, Wellington, Canterbury, Otago, and Southland.

Soil Types and Climate

Though rape produces best on free-draining loams of medium to high fertility, it can be satisfactorily grown on a wide variety of soils if given good cultural methods and adequate manuring. The only exception is on clayey soils, which are not so suitable because the grazing of rape under wet conditions detrimentally affects soil texture.

For maximum growth rape requires warm temperatures and reasonably moist conditions throughout the growing season. In areas where summer rainfall is extremely low and temperatures high it is an unreliable crop owing to low yields and its susceptibility to attack from aphids and other insect pests. On the other hand, where conditions are excessively wet rape is not successful because of its soft, rank growth and its failure to mature.

Varieties

Three types of rape seed are produced in New Zealand under the Department of Agriculture's certification scheme and are available commercially to farmers. They are Giant, Broad Leaf Essex, and Club Root Resistant; a fourth type, Aphid Resistant rape, has been released during 1960.

By J. L. SYMONS,

Instructor in Agriculture,

Department of Agriculture,

Waimate

Giant is a tall-growing type with a pronounced woody stem. It produces a good bulk of fodder initially, but second growth after grazing is negligible.

Broad Leaf Essex is a lower growing and more leafy type than Giant. It is inferior in its initial growth, but recovers well after grazing and can produce good second and even some third growth in favourable seasons.

Club Root Resistant rape tends to be somewhat taller and more stemmy than Broad Leaf Essex, but can be distinguished from both it and Giant by its longer and narrower leaves. Though not entirely immune to club root, it is highly resistant to it and its use enables rape to be grown on areas where club root attack had caused it to be abandoned.

When grown under similar conditions Broad Leaf Essex ripens quicker than either Giant or Club Root Resistant, which are about similar in this respect and are best suited for areas where the summers are dry and where they will ripen readily. In cold, wet seasons neither type, but particularly Giant, matures satisfactorily. Broad Leaf Essex also does not mature satisfactorily in these conditions, but it is preferable to the taller-growing Giant because the backs of the lambs are not kept continually wet during feeding.

Aphid Resistant rape shows a marked resistance to attack by aphids, but where infestation is not expected one of the better-known types of rape should still be used. Aphid Resistant rape is well worth a trial, however, in the drier districts where any other variety of rape is at present ruined by aphid attack. Seed supplies will, however, be limited for the next two seasons.

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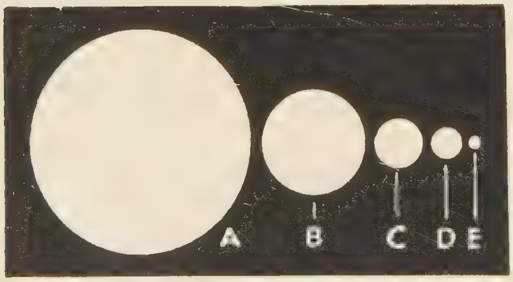

A—Particle of typical domestic flour.

B—Particle of high quality face powder.

C—Size of a Red Blood cell in the human body.

D and E—Typical particles of TARTAN FENODREN Phenothiazine.

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To minimise worm infestation of lambs grazing the crop, rape should be fed off in breaks that can be eaten off in not more than 10 days, a period which breaks the life cycle of harmful internal parasites.

Place in Rotation

Rape is an extremely convenient crop in that it can be grown satisfactorily anywhere in the rotation provided the fertility is reasonably high. However, it thrives best on soils which are well supplied with organic matter and for this reason the sowing of rape after grass, which is done on many mixed cropping farms, has much to commend it. Sowing after a winter forage crop such as swedes, turnips, or chou moellier is fairly common on many arable farms, and though good crops are usually grown, there is always a risk of club root occurring, as they all belong to the same family. Therefore, when club root is known to be present and a crop of rape is required the sowing of Club Root Resistant rape is absolutely essential. Failure to do so could result in the rape crop being a complete failure.

On high-fertility soils where intensive cropping is practised rape is generally sown after wheat in the rotation. Under this system rape is used to good purpose as a restorative crop and, provided cultivation practices are sound, not only will a good crop be grown, but the soil will be left in excellent heart for the sowing of a further cereal crop.

Where mixed cropping is practised rape is regarded as an ideal crop to precede a cereal crop, particularly wheat, as a suitable seedbed can be obtained with a minimum of cultivation. On the other hand, in many North Island districts where cash cropping is not common, sowing down after the rape is fed off is regarded as satisfactory for establishing new grass.

The feeding off of rape is usually completed by the end of February and working of the stubble immediately afterward allows for sowing before the end of March. This method, though sometimes sucessful in the South Island, has been found risky because of the later feeding of rape or, at other times, dry soil conditions which have prevented the grass from becoming well established before the onset of winter. A much more common practice is to undersow the rape with grass or to follow it with a green-feed crop and a fallow before grass is sown the following autumn.

Cultural Methods

As it is small, rape seed requires a firm, fine, well worked seedbed for rapid and even germination. An adequate reserve of moisture in the soil is also essential to enable the crop to withstand the normally dry weather during its growing period in December and January. These requirements can usually be obtained only by early and thorough cultivation before sowing. Therefore, when sowing rape after grass the usual practice is to plough early in winter to allow good weathering of the soil and time for the turf to rot and disintegrate. Timely cultivation in spring with discs, hustler, and harrows will ensure good conservation of moisture and adequate consolidation of the soil. Moreover, reasonably effective control of those perennial and annual weeds which can often prove a problem in rape crops can also be obtained during this fallow in favourable seasons.

Another common method when rape follows grass is to surface cultivate in early spring with the grubber and hustler or the chisel plough. This is quite effective in districts which have an assured summer rainfall or on soils which have a good moisture-holding capacity. Care must be taken, however, to ensure that the topsoil is not unduly dried out with excessive cultivation. On swede or turnip areas which have been fed off in wet weather the use of a narrow-tined hustler to break the surface before ploughing prevents caking of the surface and makes subsequent cultivation much easier.

Whatever method of preparatory cultivation is adopted, it must be adequate

Features of Rape Growing in New Zealand

Area grown	140,000 acres, with a declining tendency
Main growing districts	Canterbury, Otago, Southland
Most suitable soils	Free draining loams of medium to high fertility
Varieties	Broad Leaf Essex, Giant, Club Root Resistant, Aphid Resistant (just released)
Fertiliser	1 to 2 cwt of reverted or serpentine superphosphate
Normal sowing rate	2½ to 3 lb in drills up to 14 in. apart; half this rate when ridged or sown with Borre lupins
Normal sowing period	Late September to November, successive sowings depending on when required for feeding
Utilisation	Lamb fattening. Second growth useful for flushing ewes. A good crop will fatten 30 or more lambs per acre

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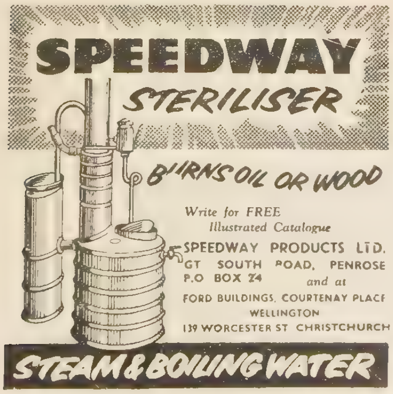

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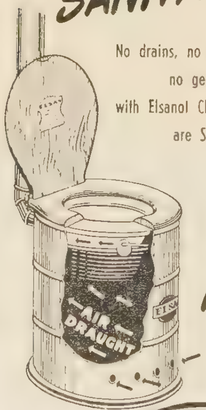

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and thorough if the rape is to thrive and make vigorous growth.

Time and Methods of Sowing

The time of sowing depends largely on the period at which the crop is required for feeding. A good knowledge of local conditions is therefore necessary to gauge how long the crop will take to reach maturity. This time may vary between six and 14 weeks, but under average conditions in Canterbury, where most rape is grown, eight to 10 weeks are usually required. In districts where the rainfall is normally good, or on soils of high fertility, it may take considerably longer. Therefore, if rape is required for January feeding, it should be sown between mid October and early November.

Once rape reaches maturity the normal feeding period is from four to six weeks. Thus, to obtain a continuity of rape at the correct stage of maturity it is necessary to make sowings at suitably spaced intervals, or about every fortnight.

The swing to early lambing in many parts of Canterbury and, as a consequence, earlier weaning has resulted in rape being sown in late September or early October in an attempt to have fattening feed available during December. This practice is not always successful, as rape requires a warm soil for rapid growth and hot, dry weather for ripening, conditions which are not always experienced at this time of the year. Therefore, where early weaning is practised it is generally safer to provide some other alternative feed such as pasture or lucerne for after weaning than to rely too much on early rape.

Rape may be sown in rows or ridges up to 28 in. apart, but most commonly it is sown through every coulter of the drill. Ridging of rape is not common today and is mainly confined to areas where annual weeds can be a problem and intercultivation is necessary to ensure a successful crop. In the North Island, where a drill is often not such a common possession as in the South Island, rape is often sown broadcast with manure through a fertiliser topdresser. Sowing through the 3½ in. grass-seed coulters is becoming common on many Canterbury farms and has proved quite satisfactory where the seedbed is free of turf and the seed is adequately covered. However, the usual method is to sow in 7 in. rows.

Whatever method of sowing is used, it is important that the seed is not buried too deeply. Only with a well worked and consolidated seedbed can this be prevented. Light harrows should always follow the drill to ensure even covering of the seed. The roller should never be used for this purpose or at this time, because if rain falls after sowing, a crust will form and this is detrimental to rapid establishment.

The rate of seeding for rape sown in 3½ in., 7 in., or 14 in. rows is usually between 2½ and 3 lb per acre. When sown in ridges the sowing rate can be reduced to 1¼ lb per acre. Seeding rates for Aphid Resistant rape should be somewhat lighter, as the seed is smaller than that of other varieties.

As a precaution against "rape scald" or other dietetic troubles such as scouring, the sowing of up to 4 oz per acre of mustard is common. Linseed (5 to 6 lb) is often included for a similar purpose.

Rape is often sown in association with other crops such as lupins, Italian or short-rotation ryegrass, and turnips. This practice has found increasing favour in recent years because of the risk of severe aphid infestation causing complete loss of the rape crop. As a result of trials carried out by the Crop Research Division, Department of Scientific and Industrial Research, at Lincoln, the sowing of one bushel of Borre Blue lupins with 1¼ lb of rape is recommended as a more reliable crop than rape alone for average conditions in North Canterbury. Its yield of dry matter, even in dry seasons, is higher than that of rape, and it is very palatable and has given good results in lamb fattening.

The sowing of ½ bushel of Italian or short-rotation ryegrass is also common in many districts. These grasses, when sown under such conditions, are not regarded as good lamb-fattening feed, but they are very reliable and will provide useful feed in late autumn or in the following spring for other purposes.

White-fleshed turnips may also be sown at up to 4 oz per acre with rape. Provided the turnips do not succumb to the virus disease cauliflower mosaic, they will provide quite good fattening feed, particularly in late autumn, and the aftermath is useful for the early winter feeding of ewes.

Fertilisers

Rape, in common with other brassicas, responds to adequate topdressing with fertilisers. Phosphates are the most important and it is customary to apply from 1 to 2 cwt per acre of reverted or serpentine superphosphate at sowing. Superphosphate when applied at more than 1 cwt per acre can detrimentally affect the germination of seed and for this reason its use at higher rates is not recommended.

Recent research work in North Otago has shown that a deficiency of sulphur can often prove a limiting factor in the successful growing of rape on some soil types, particularly those of a tarry nature. Where such a deficiency is known to exist higher rates of superphosphate or a mixture of superphosphate and sulphur are recommended.

On many soil types in Otago and Southland, particularly those which are low in fertility as a result of overcropping in the past, excellent results have been obtained from up to 2½ oz of molybdenum per acre. It is impossible, however, to recommend specifically where molybdenum should be used. Where a deficiency is suspected the local Farm Advisory Officer should be consulted.

Organic nitrogenous fertilisers, such as blood and bone, mixed with equal proportions of reverted superphosphate, are very satisfactory for rape, particularly on soils of low fertility.

Sowing Pasture or Lucerne with Rape

The sowing down of pasture with rape is very common in many arable farming areas. The seeding rate of rape should then be reduced to 1 lb per acre. If sown at heavier rates, the rape will tend to smother out the pasture and a very open sward will result. This will ultimately fill in, but many of the desirable slower-establishing species such as cocksfoot and timothy will have been killed and the production of the pasture will be very low in its first year.

The sowing of lucerne with a low seeding of rape is becoming common in North Canterbury. Such sowings are generally made in late September or October and, provided the summer is normally dry and excessive growth of the rape is prevented, establishment of lucerne will normally be good.

Subsequent Cultivation

Cultivation of growing rape, apart from ridged crops, is not common. In some parts of Canterbury, however, the ordinary crop sown in 7 in. rows is sometimes cultivated with the tine harrows when it is about 4 in. high.

Such crops must be sown at a heavier rate to allow for some loss of plants during harrowing. The loosening of the surface soil, especially if it has been caked after rain, accelerates the growth of rape. Harrowing also gives control of annual weeds in suitable weather.

Utilisation

Rape is mature and ready for feeding when the leaves turn bronze or reddish blue. At this stage it is a very palatable and highly nutritive feedstuff.

The ability of rape to mature or ripen has an important bearing on its nutritional qualities. In its immature state rape is low in dry matter and has a high percentage of crude proteins in relation to its carbohydrate content. If fed at this stage, it can cause digestive upsets which will often result in scouring and poor fattening. In unfavourable seasons farmers often have no alternative but to feed rape at this stage, and good lucerne or clover hay should then be provided to supplement the diet.

The dry matter content of rape increases on the crop's ripening, however, and there is a higher ratio of carbohydrates to crude proteins. It is important to graze the crop as soon as it reaches this stage, because if feeding is delayed too long, the dry matter will become fibrous and less digestible. For this reason sowing should be planned to have crops maturing at intervals of about a fortnight; if the grazing period of a large area is too extended, part of the crop will have advanced beyond its best nutritive value.

A crop to be grazed should be temporarily fenced off into blocks of a size that can be eaten off in about 10 days. A period no longer than this is desirable, as it breaks the life cycle of harmful internal parasites. For the same reason lambs should not be allowed to run back over previously grazed areas. Access to permanent pasture, which could also be possibly heavily infested with worms, is equally undesirable. If lambs are to be allowed a run off, and trials have proved that it has no real advantages except in prolonged wet weather, a stubble area or a paddock which has been cut for hay should be used. Lambs should always have access also to a good supply of clean water.

To obviate digestive disorders lambs should always be started on mature rape, preferably during dry weather. Lambs that are too hungry when first put on to rape are likely to overeat; they should be well fed before they are introduced to any new crop.

The time taken for lambs to fatten on rape varies with the condition of the rape and the condition or breed of lambs. However, good forward lambs will take an average of four to five weeks to fatten. Backward lambs under poor conditions may take three months or even longer.

The number of lambs which can be fattened to the acre also fluctuates widely, but a good crop in warm weather will fatten from 25 to 30 head per acre.

Club Root Disease

The principal disease affecting rape is club root. This disease, which affects all cruciferous crops such as swedes, turnips, and cabbages, is soil borne and when the spores enter the root hairs of host plants they cause the characteristic swellings known as club root. This interference with the root structure impairs the supply of moisture to the plant, so that the first observable symptom is often the wilting of the leaves on a hot, sunny day. Later these swellings may decay and death of the plant usually follows.

The disease is very difficult to eradicate, as the spores which carry the disease may remain viable in the soil for some years. Other cruciferous weeds such as wild turnip and shepherd's purse may carry on the disease in the absence of brassica crops. Clean land can often be infected with club root by stock feeding an infected crop being run off on to it.

Club root can be minimised by rotation of crops and by heavy liming. Where it is known to be present brassica crops should not be grown more often than every six years in the rotation. On acid soils heavy applications of up to 3 tons of lime per acre three months before sowing will give some control.

However, where club root is expected and the growing of rape is a necessity the growing of Club Root Resistant rape provides the best safeguard.

Insect Pests

Aphids

A number of insect pests can cause damage to rape at various stages of growth, but the aphid is undoubtedly the worst. It can infest rape at any stage of growth, but usually the heaviest infestations occur when the rape is nearly mature, particularly in hot, dry seasons, which favour rapid multiplication of the aphids.

They can cause damage to rape not only by sucking the sap and thus lowering the vitality of plants, but also by transmitting to it virus diseases which can curtail growth and ultimately kill many plants.

Until recently no really satisfactory means of control on a field scale was possible and reliance for control had to be placed on predators and parasites which live on the aphid. Neither is satisfactory, as they do not gain ascendancy until the bulk of the damage has been done. However, with the advent of new chemicals and the release of Aphid Resistant rape aphids may not be a great problem in future.

Research work by the Department of Scientific and Industrial Research has indicated that some of the new chemicals are very effective in controlling aphids. Lindane, a contact insecticide, when applied at ½ lb of active ingredient per acre, will give satisfactory control not only of aphids but also of many other insects which attack rape. It has a good residual life in the absence of rain, but for a good kill of aphids very good coverage is essential and this is not always possible.

Methyldemeton, a systemic insecticide, will give better control of aphids than lindane. Being a systemic insecticide it not only overcomes the coverage problem but also has very little harmful effect on other beneficial insects. Applied at 16 fl. oz. per acre, it will prevent any further reinfestation for at least seven days.

It requires to be carefully handled and farmers should rigidly follow the instructions on the label. Stock also should be kept off sprayed rape for at least 14, and preferably 21, days.

As for all other like preparations, a permit is required if methyldemeton is to be used on a flowering brassica crop between 1 September and 30 March; for aerial application the operator must obtain a permit from Civil Aviation authorities.

Caterpillars

The caterpillars of the white butterfly and the diamond-backed moth often cause severe damage to mature rape crops in hot, dry summers which favour rapid breeding. Spraying with DDT at ½ to 1 lb of para para isomer per acre or lindane at ½ lb per acre will give effective control. Caterpillars of the diamond-backed moth and of the white butterfly are attacked by a fungous and a virus disease respectively, but these attacks seem to be confined to late autumn.

Other Insects

Other insect pests such as springtails, wheat stem weevil, wheat bug, and brown beetle often cause damage to or death of rape in the seedling stage. With the exception of the brown beetle, all these can be effectively controlled with lindane at ½ lb per acre. Regulating the time of sowing so that crops are not in the seedling stage when the brown beetle is on the wing is the only means of preventing damage by this insect.

Summary

Rape is grown extensively in New Zealand for the fattening of lambs and it is one of the best crops for this purpose. It may be grown on a wide range of soil types, but does best where summers are moderately dry. Highly productive strains have been bred to meet different requirements, so it is important to sow certified seed. Thorough cultivation and sound cultural practices pay handsome dividends in the returns obtained from the crop.

Care is necessary in the grazing management of rape and methods must be adjusted to meet altered conditions. Disease and insect pests can at times play havoc with the crop, but suitable management and the use of chemicals can minimise the risk. Plant breeders are also playing their part by producing resistant strains.

◆

Studies in Farm Management

WAIRARAPA INLAND HILL COUNTRY

TYPICAL of the North Island east coast districts, noted for their production of meat and wool and also provision of surplus breeding stock for the lowland farmer, is the Wairarapa, where the major farming activity is breeding store sheep and cattle under pastoral conditions.

By F. G. SPITE,
Farm Advisory Officer,
Department of Agriculture,
Masterton

THE Wairarapa is frequently regarded as the plains round Masterton and Carterton and the hill country to the east of these plains, and not so well known is the hill country to the north. Considerable reversion to manuka and fern is evident in this area and the broken country makes land development and stock management difficult. Some idea of the problem of developing and improving this country is given in this study in farm management.

The Wairarapa hill country may be divided climatically into three main classes, each of which has its own management problems:

1. East coast hills, subject to uneven rainfall and summer droughts.
2. Inland hills remote from the Tararua Range and the sea coast with moderate rainfall fairly well distributed.
3. Foothills of the Tararua and Rimutaka Ranges with high to very high rainfall.

Inland Region

The inland region which is the subject of this article comprises some 190,000 acres in the Mauriceville and Eketahuna Counties.

The annual rainfall ranges from 45 to 50 in. Summer growth is usually well sustained with no prolonged dry periods, but carrying capacity is restricted by wet winters and strong westerly winds. Frosts of 10 to 15 degrees are experienced and falls of snow are short and are mainly confined to the ranges.

The hills vary from very steep greywacke and mudstone to moderately steep and rolling sandstone and argillite. There are small areas of flat land on valley floors. The soils tend to be fairly highly leached and erosion by surface slumping and gullying occurs on the steeper mudstone and argillite hills.

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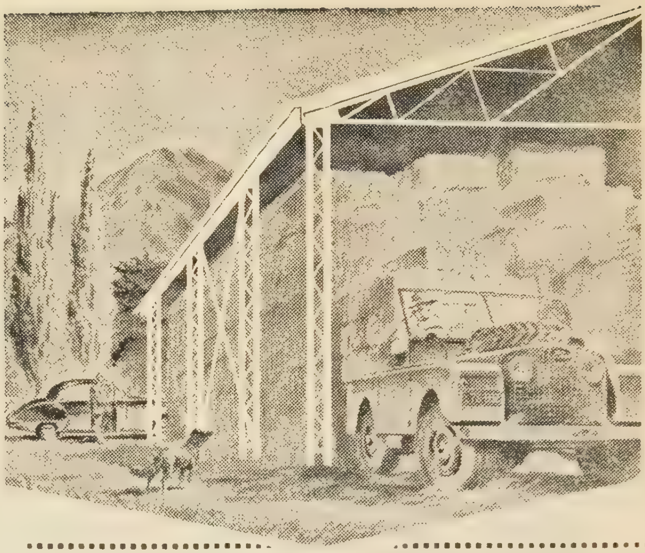

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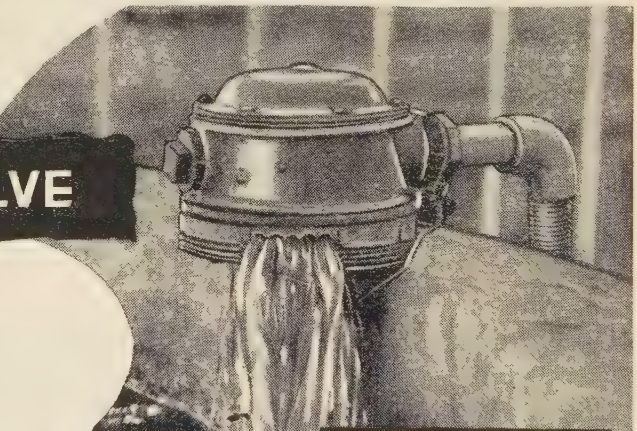

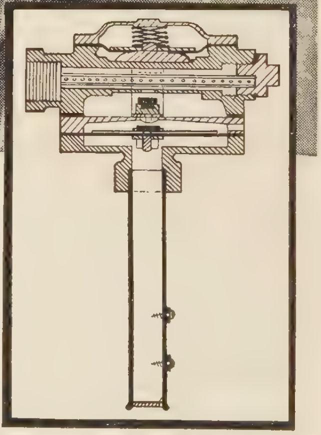

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The natural fertility of many of the soils is low and invasion by scrub and fern is a problem over much of the area, its control on the steeper slopes being difficult and costly.

Large areas at present scrub dominant afford ample cover for deer and wild pigs, which invade the surrounding cleared land and damage pastures.

Easier country which can be worked with machinery is generally broken by steep gullies that make access difficult.

Water supply from creeks and streams is generally adequate on this country, though with greater subdivision some use is being made of dams.

AN INLAND HILL COUNTRY FARM

A 1,300 acre farm in north Wairarapa some 15 miles from the east coast illustrates the problems and development of this district.

It comprises rolling, moderately steep, and very steep hills broken by many steep-sided gullies. The property is long and narrow and a river flows along its eastern boundary.

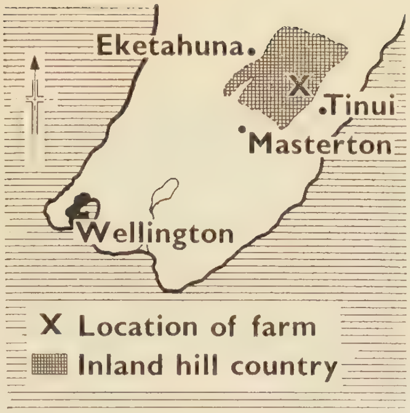
The altitude is 900 ft at the homestead and rises to 1,300 ft at the back of the farm. The lower country is mainly easy to moderate slopes broken by narrow, steep gullies.

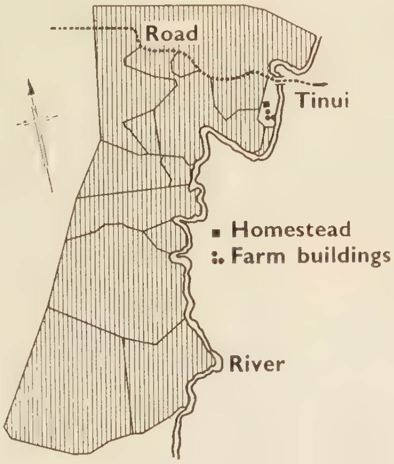
The soils are of sandstone origin, low natural fertility, and poor structure.

Some 600 to 700 acres of rolling country and rounded tops of steeper hills can be worked with agricultural machinery.

At the back of the farm there are steep mudstone hills with greywacke rock at the highest levels.

The higher altitudes are more fertile and have remained in fair pasture with only mild reversion to manuka.





Farm layout.

Before the present owner took over in 1947 the farm was grazed extensively with periodical burning to control secondary growth. No pasture topdressing or liming had been done.

Paddocks near the homestead that had been ploughed with horses some years before were resown to grass, which in the absence of lime and suitable fertiliser failed to thrive. There was rapid reversion to browntop, danthonia, moss, and other low fertility species.

By 1947 about half the property was infested with scattered manuka scrub with small clear areas of inferior grazing. About 30 acres of more recently sown pasture had been well maintained and was carrying a good sole of English grasses and clovers.

Though the easier country had been fairly well subdivided, fences had deteriorated and some needed complete reconstruction.

The better hills at the back of the farm were providing practically the entire grazing for the 750 ewes and 30 breeding cows.

Development

There were three phases of development:

1. Improvement of quantity and quality of grazing by ploughing, cropping, and regrassing the easier country. In the early years soil fertility was built up and feed supplies increased to meet the needs of existing stock. The aim was to improve wool returns per head and build up a sound flock.
2. Improved grazing management and stock control through fencing, rotational grazing, and better pasture utilisation.
3. When a satisfactory flock was developed stock numbers were increased to keep pace with higher production from the new pastures.

▼ Easier developed slopes broken by rough country.

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Mob stocking on untopdressed mudstone country.

Revenue from farming was low and the broken country and dense manuka scrub made stock handling difficult.

A start was made in 1947 with a team of draught horses, a swamp plough, and cultivation implements. The first paddock was ploughed in the autumn out of stunted scrub and poor pasture, winter fallowed, worked down, and sown to a crop of chou moellier in the spring. The crop was used to carry the hoggets through May, June, and July when feed is critically short.

This early work was on land that had been ploughed years before and though the surface was fairly even, stumps and roots of cut manuka impeded progress.

A fresh paddock was worked each year and after the crop had been fed off the land was disced in spring, worked to a seedbed, and sown to pasture in December.

Consolidation was difficult, as the harsh, fibrous turf decayed slowly. Humus was in very short supply and a long fallow was the only way to obtain reasonable conditions for growing crops and pastures.

Cultivation has always been thorough and the benefits of exposure of the worked ground to sun, rain, and frost have been demonstrated in this development work.

Hard work for long hours enabled this farmer to break in his country with the minimum of capital outlay.

As farm returns increased a crawler tractor and implements were bought.

To date 300 acres have been regrassed and are carrying good pastures.

Seeding and Manures

The seeding rate for chou moellier is normally 2 lb per acre with 3 cwt of superphosphate.

Grass seed is drilled, whenever possible, using a coulter tip which sows 3½ in. rows, and seeding rates considerably below the average for the district have been found satisfactory.

The surface of this light sandy loam may dry rapidly after sowing, and drilling all seeds is good insurance against poor establishment.

The pasture mixture (30 lb an acre) that has been used on the developed country is cocksfoot, perennial ryegrass, short-rotation ryegrass, subterranean clover, white clover, and cowgrass (all certified if possible).

All established pastures are cocksfoot dominant, the light seeding rate encouraging establishment of this valuable grass.

A heavy seeding of clovers on land which previously had little more than a sprinkling of stunted annuals is considered desirable to build up the fertility rapidly.

The climate favours late spring, summer, and autumn growth and the seeds mixture is proportioned to take advantage of this.

Lime at 1 ton per acre is applied during summer or autumn after sowing and normally 3 cwt of superphosphate is sown with the seed.

Stock and Pastures

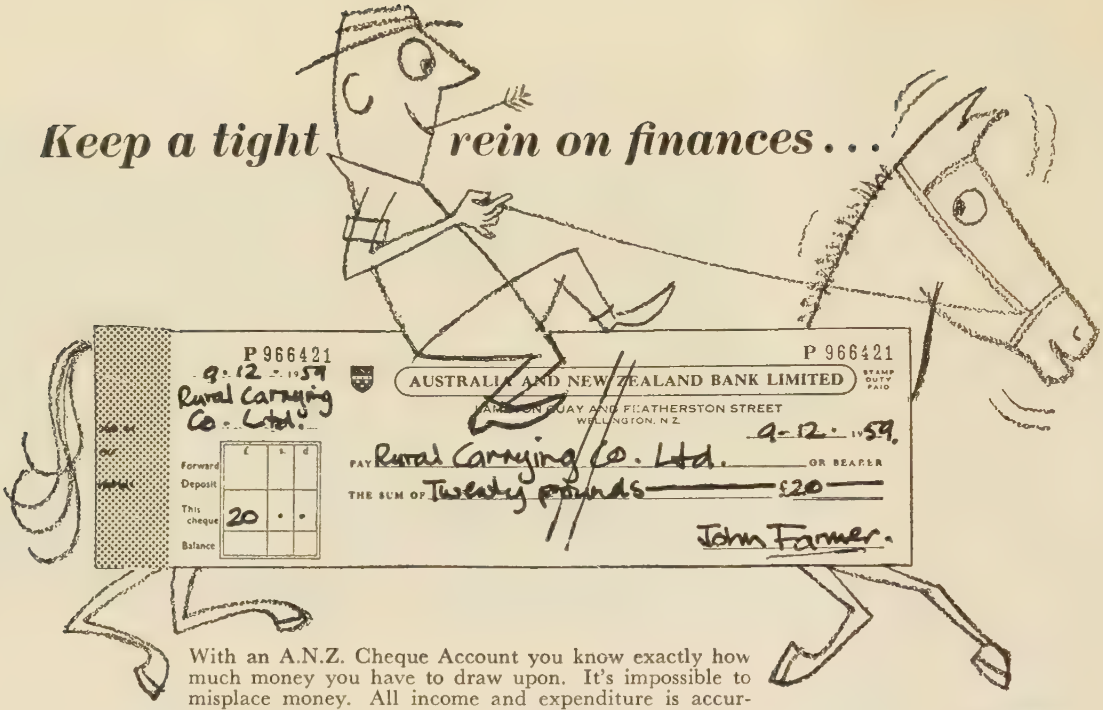
The ewe flock has now reached 1,300 and the farmer, an excellent judge of stock and their requirements, has long recognised the benefits of efficient pasture utilisation by controlled grazing.

From weaning to lambing, the ewes are run as one mob and as far as possible the improved pastures are optimum grazed, allowing feed to be carried well through winter. The unimproved paddocks are kept closely and evenly grazed and the palatability of the pastures retained.

The shape and layout of the farm make it necessary for the ewe flock to graze some paddocks twice in the rotation, but the pasture is grazed for shorter periods to prevent excessive defoliation.

Frequent handling of stock makes it easy to muster scrub country cleanly.

Keep a tight rein on finances . . .



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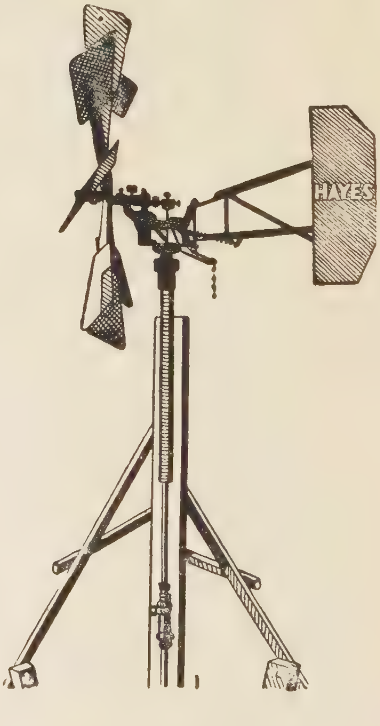

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During lambing, which begins in late August, unlambed ewes are shed off and the ewes with lambs gathered together for docking.

The developed paddocks are used for lambing and with one mob and short distances to travel, close attention can be paid to shepherding. On a one-man farm this is a decided advantage with ewes trained to frequent shifting.

When docking is completed the ewes and lambs are run as three mobs of about 400. Each mob grazes three or four paddocks with shifts every two or three days, depending on growth and paddock size. The sheep are moved quietly and there is no trouble with mismothering.

Each paddock has several days' spell and pastures do not become fouled. The lambs do very well under this pattern of grazing and are always on the best available feed.

As growth exceeds the flock's requirements a few paddocks can be closed for early autumn feed, normally in November when any rank growth which has been neglected by the sheep is cleared up with the heavy concentration of cattle. If the season is favourable, mature feed with good clover content is available for use in the critical autumn months.

Drenching of lambs for parasites has not been found necessary.

Careful planning of feed supplies by use of saved pasture and cropping is the basis of rearing a sound flock.

Wether lambs are sold after weaning. Though these could be drafted and a number sold fat, it has been more satisfactory to sell on the farm as a forward line.

A herd of 75 breeding cows is run to control pastures. The policy of grazing and sale of young stock is flexible and varies with the season. Steers and surplus heifers may be sold in the autumn as weaners or carried through the winter and sold as yearlings.

In the late winter and early spring breeding cows are normally spread over the farm to avoid excessive trampling on the wet soils.

Topdressing has so far been confined to the sown pastures, as the regrassing programme has absorbed most of the surplus revenue. A good response to aerial topdressing and oversowing could be expected from the better mudstone soils at the back of the farm.

Newly sown pastures receive 2 cwt of superphosphate or basic slag for the first two or three years and thereafter are topdressed normally every second year.

Fertiliser is applied by the farmer with his own truck-mounted machine. Severe attacks from grass grub have necessitated the periodical use of DDT-superphosphate.

▲ About 1,300 ewes passing through gateway from undeveloped to improved pasture.

▼ Ewes settle down and graze shortly after being moved.

Plant and Buildings

The development programme has involved the use of heavy machinery and the plant which has been built up over the past few years is adequate for the work.

Agricultural machinery consists of crawler tractor, swamp plough, giant discs, tandem discs, light grader, harrows, drill, topdresser, and truck.

The farm buildings include woolshed, sheep and cattle yards and dip, implement shed, and stable. Plantations are established near the homestead and buildings.

Production

Increased returns have been achieved almost entirely by the owner's own efforts in breaking in 300 acres of land and adopting a high standard of stock and pasture management.

With the capital and labour available it has not been possible to clear or topdress any of the remainder of the farm, of which it is estimated that 400 acres provide no grazing, being impenetrable to stock. Six hundred acres is in fair pasture, containing traces only of annual clovers.

Stock numbers were kept substantially the same for the first five years of the development, but production per head and per acre in terms of wool weights and quality and lambing percentage increased annually.

Figures showing results of improvement work are as follows:

	1947	1953	1959
Breeding ewes	750	800	1,300
Hoggets wintered ..	300	400	650
Wool per acre of grazing country (lb)	7.5	12.0	21.0
Wether lambs sold ..	280	380	600
Breeding cows	30	40	75

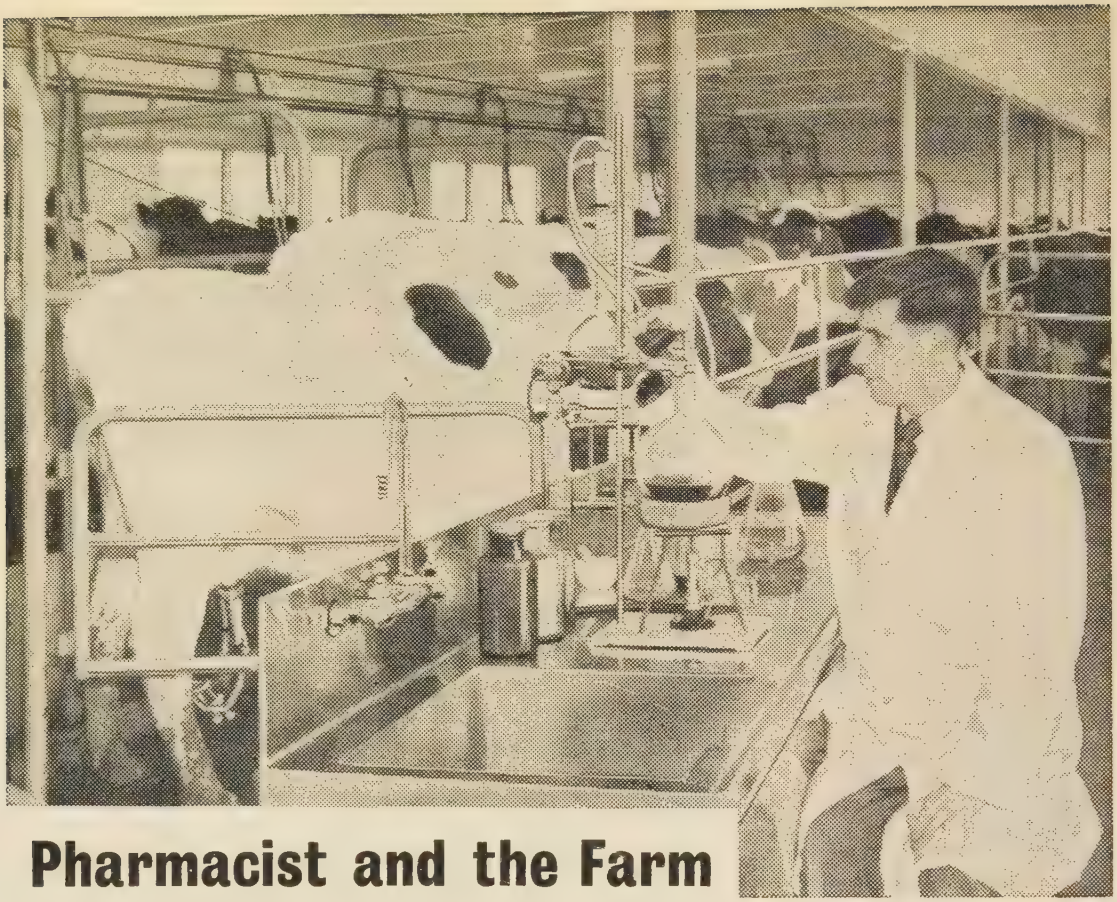
Summary

Problems of climate, soil fertility, distance from markets, and stock handling are associated with much of the Wairarapa inland hill country.

The development programme on this farm has been made possible, in the absence of substantial capital reserves, by the initiative, drive, and hard work of the owner.

Simple principles of preventing selective grazing and excessive defoliation of pastures have been incorporated in the management techniques.

Lime and fertilisers have been necessary, but the farmer's skill in managing stock and pastures has been primarily responsible for the excellent results.



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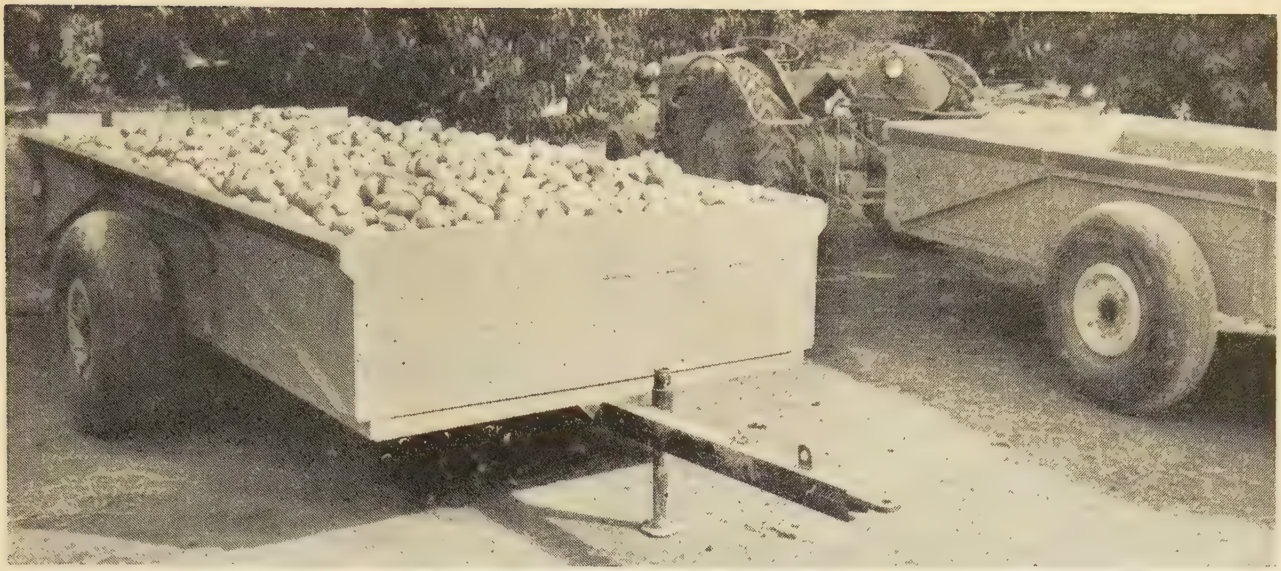

Suitable Bulk Harvesting Equipment for Three Sizes of Orchards

NEW ZEALAND pip fruit growers were the first in the world to introduce bulk harvesting. The practice has become widely adopted since it was first tried eight years ago and there is now sufficient experience of it on which to suggest types of equipment that appear most satisfactory and economically sound for three sizes of orchards. They are discussed in this article by J. L. NICHOLAS, Senior Horticultural Inspector, and M. G. BAUMGART, Assistant Horticultural Superintendent, both of the Department of Agriculture, Nelson.

USE of bins holding 20 to 100 bushel cases of apples or pears in place of picking cases began in New Zealand in 1952. Since then the system has become widely adopted and at present about 75 per cent of the crop in both Hawke's Bay and Nelson, the principal pip fruit areas, is being handled this way. As the method was completely new, much experimenting was necessary and many different systems were developed. Some of these have not been as satisfactory as others, but once a system is embarked on it sometimes becomes too expensive to discard it.

The main reason for adopting bulk harvesting is the saving in labour:

- **In the orchard:** No handling of cases by the pickers. This has increased the picking rate by at least 10 per cent.
- **Carting to the packing shed:** No individual handling of cases or carting out of empty cases.
- **In the packing shed:** No bulk stacking of full cases or continuous feeding of the grader hopper by hand.

The saving may represent up to six handlings of individual cases, and bruising of fruit should be reduced substantially with properly constructed equipment.

Capitalisation

Over-capitalisation of orchards is a problem in New Zealand. Under our system of growing and marketing, practically all the apples and pears are graded and packed on the grower's property immediately after picking. The sheds and equipment required are expensive and add considerably to the capital invested in a property. As the bulk of New Zealand production comes from orchards producing 10,000 to 15,000 bushels a year, the investment for grading and packing facilities forms a considerable portion of the total capital investment.

In assessing what would be a satisfactory level of capital investment for bulk harvesting equipment it is suggested that 15 per cent should be allowed for interest on capital invested and for depreciation and maintenance. This outlay can only be justified by equivalent savings in labour costs.

It appears that savings which can occur are as follows:

1. By increasing picking rate: about 10 per cent of pickers' wages.
2. By reducing time taken in carting in and supplying empty boxes: about 7½ per cent of pickers' wages.
3. By reduction of shed labour: about 10 per cent.

Total saving is about 15 per cent of overall labour cost, including the owner's share.

Justifiable Expenditure

In considering what expenditure on equipment is justified, orchards having an annual production of (a) 8,000 bushels, (b) 16,000 bushels, and (c) 24,000 bushels can be taken as examples.

(a) 8,000 bushels: During the three to four months of harvesting an average orchard of this size will employ (on the basis of a 40-hour week) five adult full-time workers (including the

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owner and his family), possibly three females and two males.

On 1959 costs the total wage bill will be about £600 per season. A saving of 15 per cent would represent £90 per year. Capitalising this figure on repayment and maintenance rates already mentioned would suggest £600 as a satisfactory level of capital investment in bulk harvesting equipment for an orchard of this size.

(b) 16,000 bushels and (c) 24,000 bushels: It has been shown above that the level of investment can be about equal to the total wages of seasonal labour for harvesting and packing. Therefore for 16,000- and 24,000-bushel orchards capital expenditures of £1,200 and £1,800 respectively are sound.

As well as being economically sound, expenditure is frequently justified because the labour in carting out empty cases and bringing in filled ones involves mainly the grower and his family.

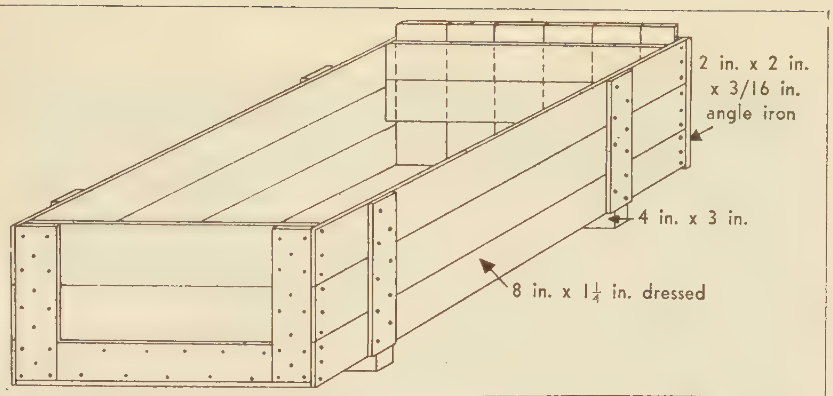
Tractor running costs may also be reduced, though not significantly, as the reduction is mainly engine idling time.

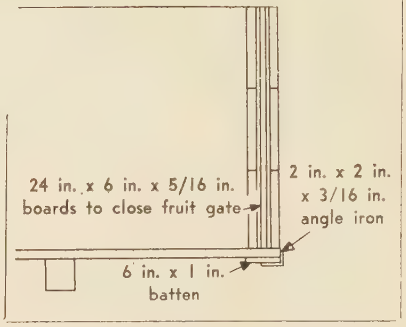
It has been shown overseas by experiment, and confirmed by observation in New Zealand, that with reasonable care good type bins and trailers reduce the amount of bruising during transit.

Bin Sizes and Construction

During the development stage bin dimensions and capacities have varied. Bins with capacities from 20 to 100 bushels have been used.

As in New Zealand packing is done on the grower's property, generally immediately after harvesting, no attempt has been made to standardise bin capacities and dimensions, and while bins remain within the orchard property there appears to be little advantage in standardisation.




24 in. x 6 in. x 5/16 in. boards to close fruit gate
2 in. x 2 in. x 3/16 in. angle iron
6 in. x 1 in. batten

Above—30- to 35-bushel bin (6 ft x 3 ft 6 in. x 1 ft 10½ in. internal dimensions). Right—Section through bin showing fruit gate.

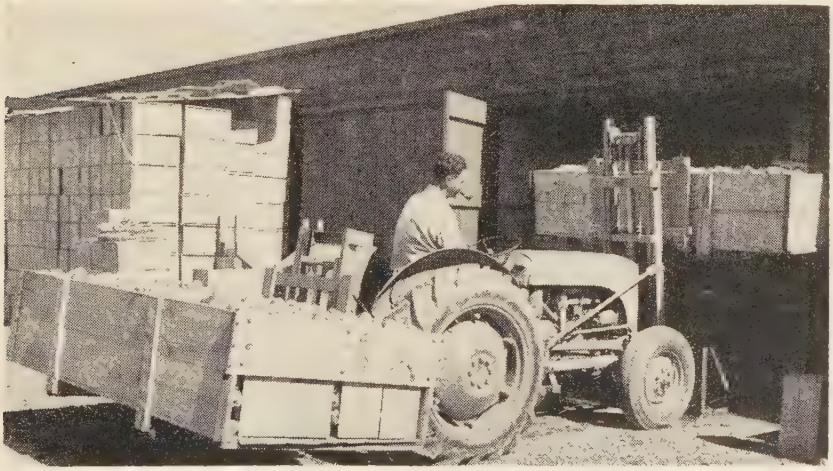
However, for what appear to be the best methods employed, two basic bin sizes appear adequate. For operation with fork lifts on tractors bins should be large enough to carry the maximum safe loading of the lift. The maximum size is governed by four factors:

1. Maximum safe loading of the forklift.

2. Position of the load centre on the forks (for example heavier loads can be lifted close in to the tractor).

3. The safe depth of fruit (with soft varieties this appears to be between 20 in. and 24 in.).

4. A safe length to allow easy handling without fear of the bin tipping.



Tractor with front forklift, with which bins are placed on the conveyor, and rear forklift, which carries a second bin just clear of the ground. This is lowered on to the ground at the packing shed and lifted on to the conveyor with the front forklift.

From investigations it appears that bins 6 ft x 3 ft 6 in. x 2 ft deep, which hold about 30 to 35 loose bushels, will fit this method of handling. This size of bin also appears adequate where trailers and orchard hoists are used. A diagram of this type is shown above.

Trailer bins with permanently attached wheels are expensive, require expensive alterations to the grader, and generally occupy more shed space. Their advantages are that they are easier to pick into, more easily handled and quick in transit, and require less skilled drivers.

The high level of capital expenditure involved in changing over to a system using trailer bins (see heading illustration on page 65) is probably justified only in orchards producing more than about 25,000 bushels per year.

The following systems appear most satisfactory for the three categories of orchards:

SMALL ORCHARDS
(8,000 bushels)

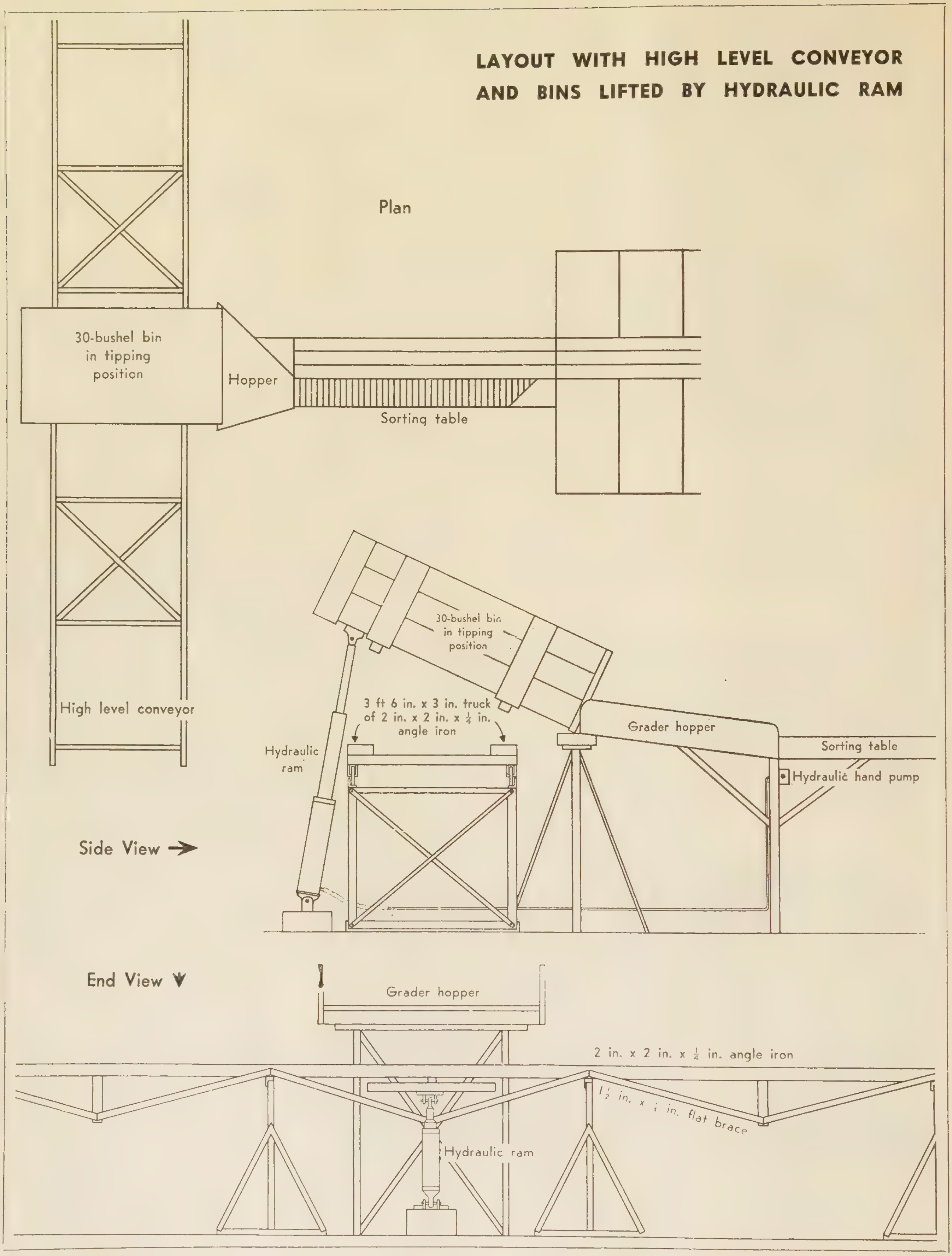
The system employed depends on the orchard tractor—whether it has an inbuilt hydraulic system, can have one fitted at reasonable cost, or whether this is impracticable.

1. Tractor with Hydraulic Lift

The equipment comprises:

- Front-end forklift capable of 5 ft of lift. This is preferable to a modified front-end loader, which tends to be unstable when travelling over orchard ground.

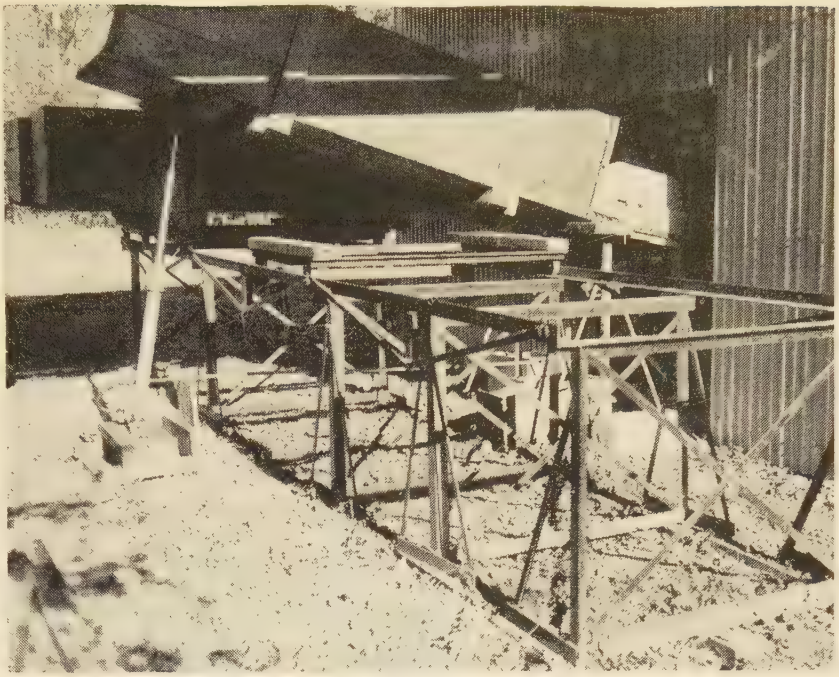
LAYOUT WITH HIGH LEVEL CONVEYOR AND BINS LIFTED BY HYDRAULIC RAM


Plan
30-bushel bin in tipping position
Hopper
Sorting table
High level conveyor
30-bushel bin in tipping position
3 ft 6 in. x 3 in. truck of 2 in. x 2 in. x ¼ in. angle iron
Hydraulic ram
Grader hopper
Sorting table
Hydraulic hand pump
Side View →
End View ↓
Grader hopper
2 in. x 2 in. x ¼ in. angle iron
1½ in. x ¼ in. flat brace
Hydraulic ram

- Rear-end forks which can carry a second bin just clear of the ground. This second bin gives better balance to the tractor.

- 35-bushel bins. The number should be sufficient to hold about 10 per cent of the total crop of the orchard's main variety; about eight to 10 bins. The actual number depends on the balance of pickers to packers in the particular orchard. Where weekend labour is used for picking it may be necessary to have more bins.

- A high level conveyor within the shed at right angles to the grader hopper. The conveyor should be capable of holding three full and three empty bins. If the shed wall height is low, the conveyor can be extended through the walls so that lifting of full bins is done outside or under another, higher lean-to roof. Shed layout, grader, conveyors, etc., are illustrated on this and opposite pages. Total expenditure (1959 costs) including that for 10 bins, forklifts, and conveyors is about £380.



High level conveyor with bin lifted by hydraulic ram. (See also diagrams on opposite page.)

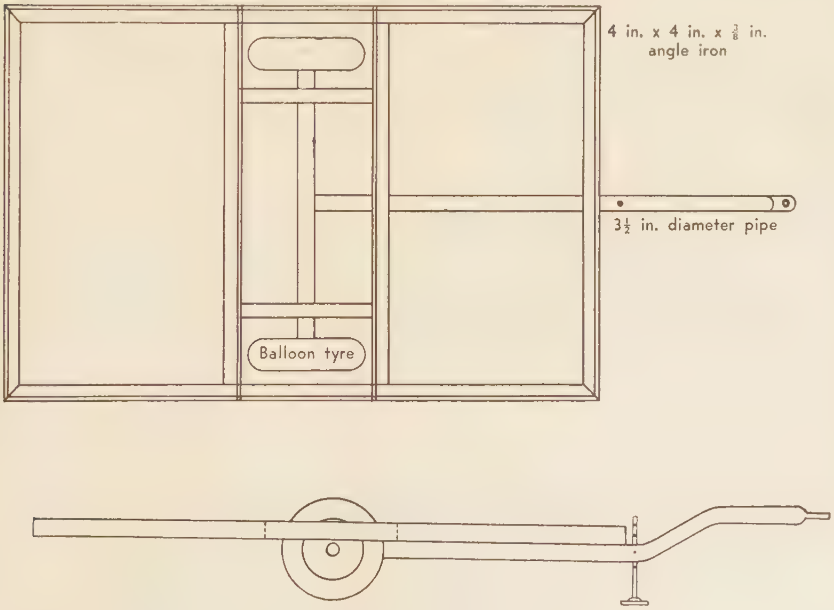
2. Tractor without Hydraulic Lift

(Or where the orchard is spread out and has a rough or hilly surface)

The equipment comprises:

- Trailers (see diagram below) carrying two to four lift-off bins. The bins remain on the trailers while they are being filled. Trailers should be constructed so that on a 12 ft length they have 9 to 10 in. of ground clearance. The top of the bin should not be more than 36 in. above ground level or the pickers will have to use steps for emptying their bags and the picking rate is reduced. Trailers with a built-in conveyor may have the bins unloaded directly on to the high-level conveyor at the shed by using a natural or artificial bank, the bins then being pushed straight on to the high-level conveyor in the shed. Generally, however, a sliding chain block mounted on a short steel beam is used to lift the bins on to the shed conveyor.

Two and occasionally three trailers can be pulled in tandem by the one tractor. Total cost of the three trailers, 10 bins, conveyors, and chain block is about £460.



Basic details of two-bin trailer.

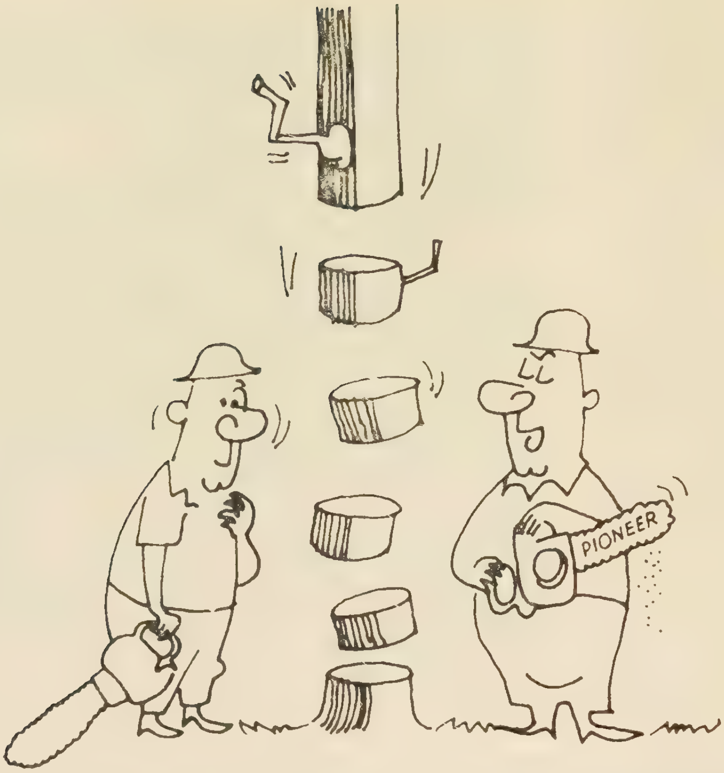
LARGER ORCHARDS (16,000 to 24,000 bushels)

These may satisfactorily employ either of the systems described for small orchards. If more automatic control of fruit delivery rate to the grader is required, the bins may be either:

1. Discharged on to an elevator lifting the fruit from ground level, the fruit then rolling into a spring hopper which, when full, stops the motor of the elevator.

2. Carried on a high level conveyor running parallel to the grader and discharged on to a wide flat belt which carries the fruit to the sprung hopper (see upper diagram on page 71). This hopper then operates the motor driving the flat belt.

Few packing sheds are large enough to allow a tractor with forklift attach-



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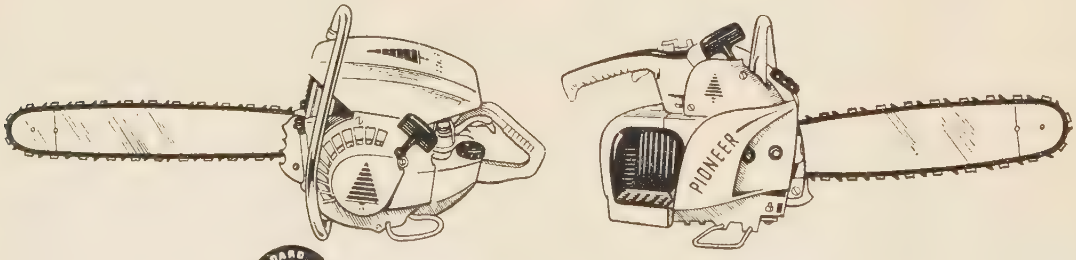

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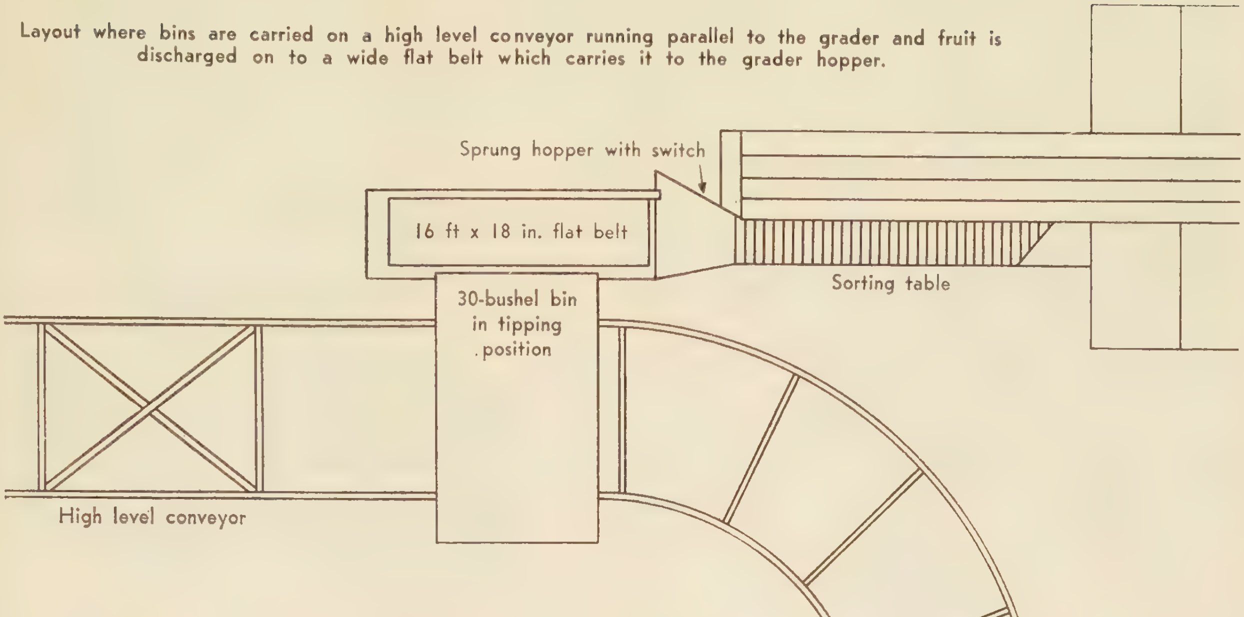
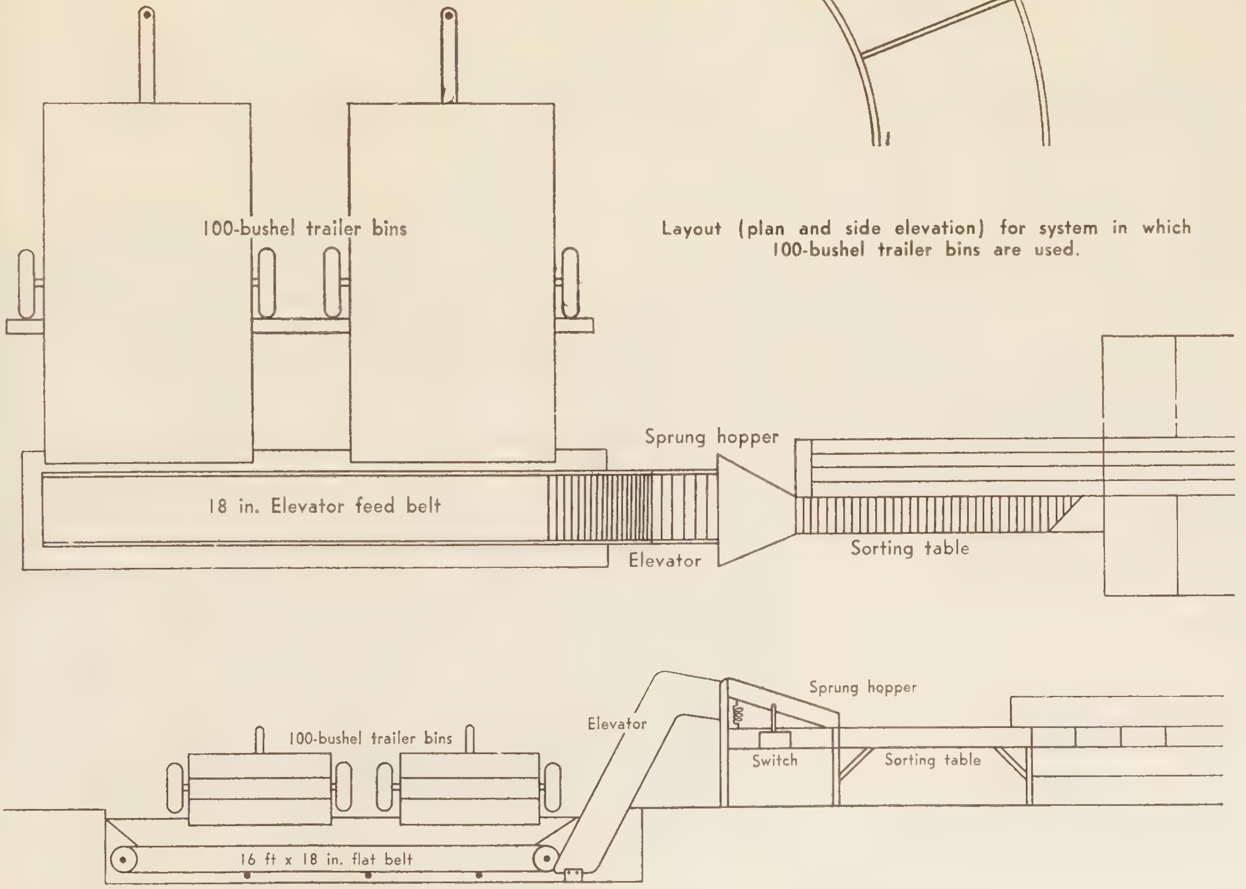
LAYOUT FOR BULK HANDLING

Layout where bins are carried on a high level conveyor running parallel to the grader and fruit is discharged on to a wide flat belt which carries it to the grader hopper.


Sprung hopper with switch
16 ft x 18 in. flat belt
Sorting table
30-bushel bin in tipping position
High level conveyor


100-bushel trailer bins
Sprung hopper
18 in. Elevator feed belt
Elevator
Sorting table
Sprung hopper
100-bushel trailer bins
Elevator
Switch
Sorting table
16 ft x 18 in. flat belt

Layout (plan and side elevation) for system in which 100-bushel trailer bins are used.

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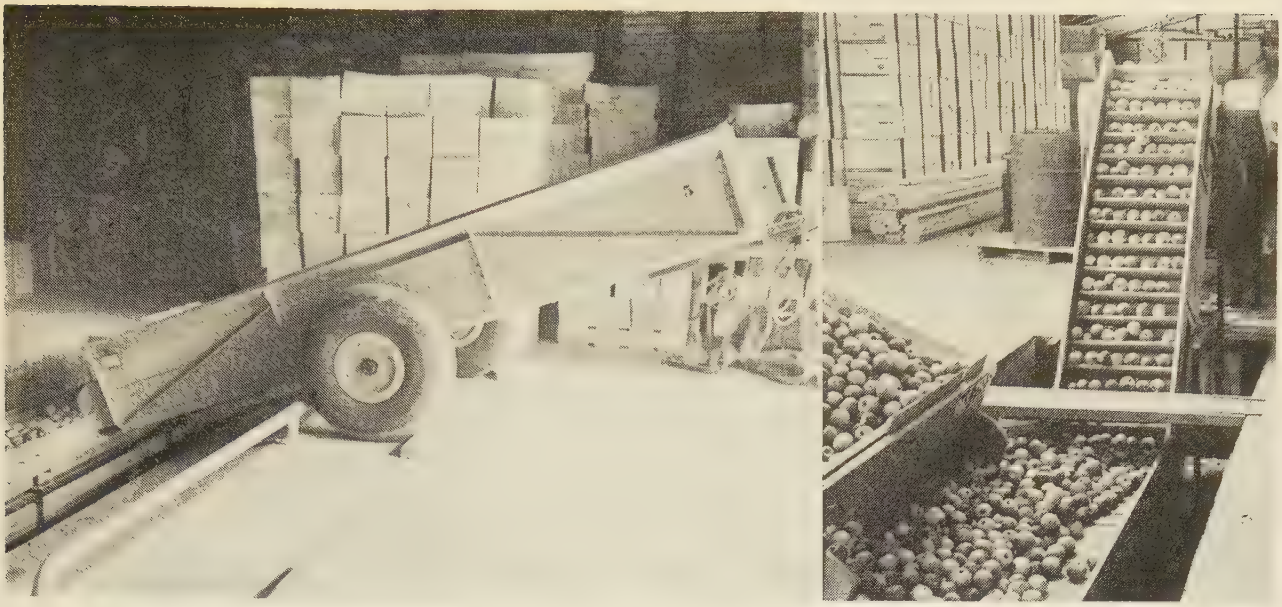
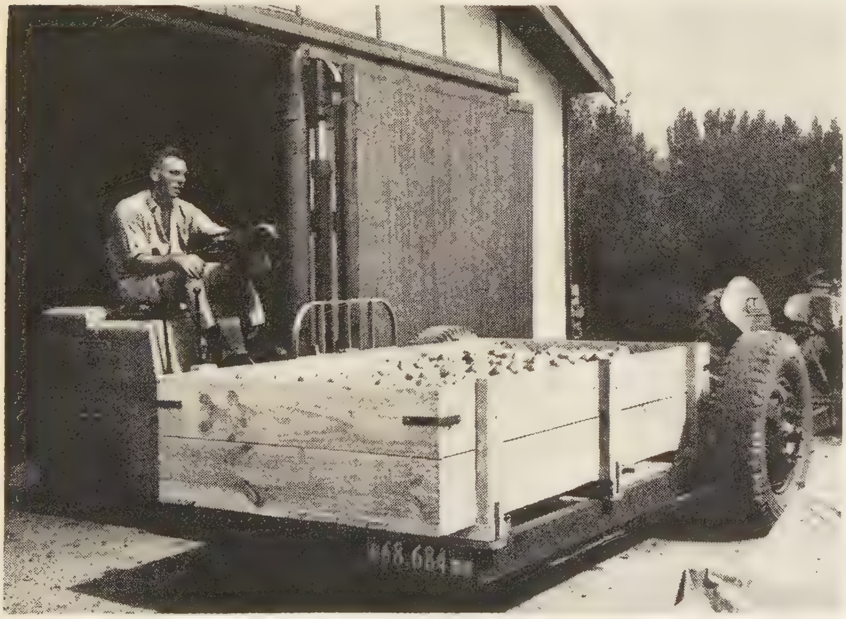


Large trailer bin emptying on to a flat belt in a pit and fruit being lifted to the grader hopper by an elevator. The considerable outlay for this system of bulk handling can be justified only in large orchards.

ment to place bins on a frame to discharge directly on to a flat belt behind the hopper, but where the cost of a separate industrial forklift truck can be justified in handling outgoing fruit, bulk bins, cases, and packing and spray materials this direct placement of bins with a truck becomes possible.

In few New Zealand sheds can the expenditure of £1,500 to £2,000 on an industrial forklift truck be justified.



An industrial forklift truck may be used to take bins from a two-bin trailer and place them directly at the grader hopper.

LARGE ORCHARDS
(Over 24,000 bushels)

Unquestionably the easiest system for pickers, carting in, unloading, and grading is that using large trailer bins emptying on to a flat belt in a pit, the fruit being lifted by an elevator and deposited into a sprung hopper, which operates the elevator drive motor to provide an even flow of fruit to the grader sorting table. (See illustrations on this page.)

The system, however, is also the most expensive. It takes considerable shed room, usually entailing additions, and the grader feed equipment and the trailers are expensive. All the equipment is tied solely to harvesting, whereas the tractor forklift has many other uses, such as for outloading packed fruit and bulk stacking of cases, fertilisers, and sprays.

Cost

The cost based on eight 100-bushel trailers would be:

	£
Eight trailers at £100 each	800
Elevator and automatic feed	300
Shed alterations, additions, pit, etc.	500
	1,600

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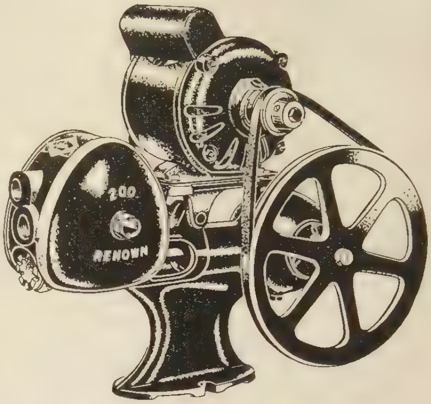

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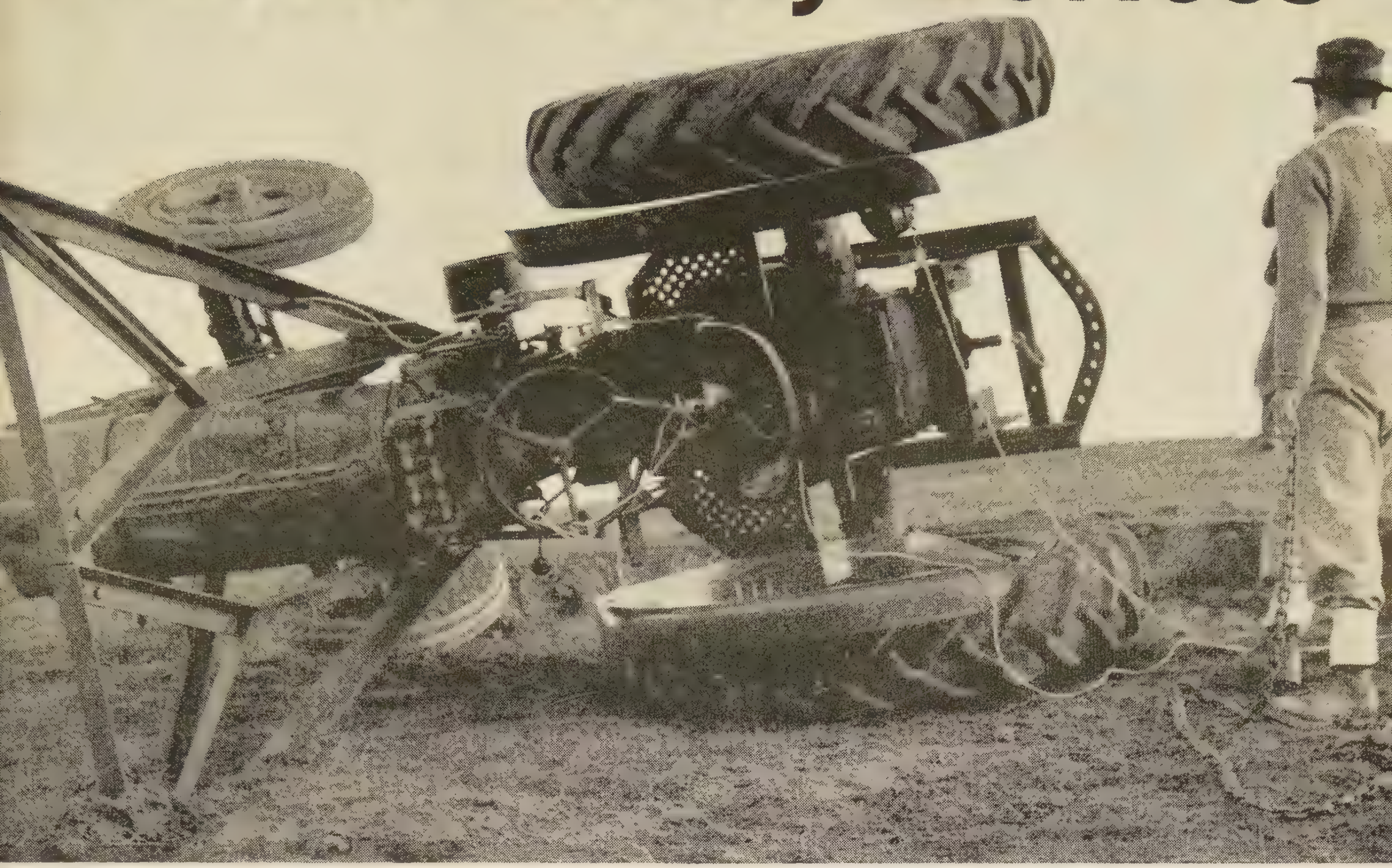
Tractor Safety Devices



[R. C. Blackmore

IN the last 11 years there have been 221 tractor fatalities in New Zealand and the annual total has twice exceeded 50 deaths per 100,000 tractors at work, a rate two and a half times that in the U.S. and six times higher than that for the U.K. Several New Zealanders have given close attention to a means of reducing this serious and often needless loss of life. Tractor safety devices developed by both local and overseas inventors, some of which have been marketed on a limited scale, are appraised in this article by C. J. CROSBIE, Farm Advisory Officer (Machinery), Department of Agriculture, Christchurch.

THERE are two main classes of tractor safety devices: those that by various means indicate the slope on which the tractor is working and those that aim to provide some measure of safety or protection for the driver.

Angle Indicators

Many inventors have felt that a knowledge of the steepness of the slope on which the tractor is working would be beneficial in reducing tractor fatalities, and many devices for measuring the slope on which a tractor is at work are available. The simplest forms consist of bubbles in curved tubes, balls in dampened curved tubes, or pendulums, all with prescribed limits within which the tractor is deemed to be safe.

A further development is to arrange an electrical circuit which closes and a light flashes when the tractor reaches the limit of the safe range. With two devices a horn can also be sounded simultaneously as a further precaution if the driver fails to notice the light. The switch in these circuits consists of a mercury switch, a pendulum swinging to meet an outer contact, or a closed vessel consisting of two metal cones insulated from one another which, when tilted, cause a ballbearing to move out and short out the two cones. In the last the angle of the face of the cones corresponds to the safety angle of the tractor.

One ingenious device consisted of a pendulum swinging within an oval ring which formed the second contact in the switch. In this way the inventor made allowance for the fact that a tractor is more stable going up and down a slope than going straight across it. He also provided for vertical adjustment of the oval ring to allow for the various safety angles of the different types of tractors.

The final stage of development of these devices was reached independently by three inventors who arranged mercury switches to short out the ignition system of a petrol motor and so stop the tractor at the limit of its safe angle. One device had a control at the driver's seat for isolating this circuit and so restarting the motor, but the other two did not.

Value of Angle Indicators

A knowledge of the slope on which he is working is beneficial to the learner driver, and angle indicators accordingly have some value. However, they have these disadvantages:

1. They record only the slope under the tractor at the time they are read, and the operator already knows this, for the tractor is either on its wheels (a safe slope for some operators) or turning over, with the operator try-

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HEADING PHOTOGRAPH: Anti-roll device (see page 85).

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- (f) **GRAIN CROP GROWERS** who in Canterbury have saved their crops as well as increased their yields during drought.
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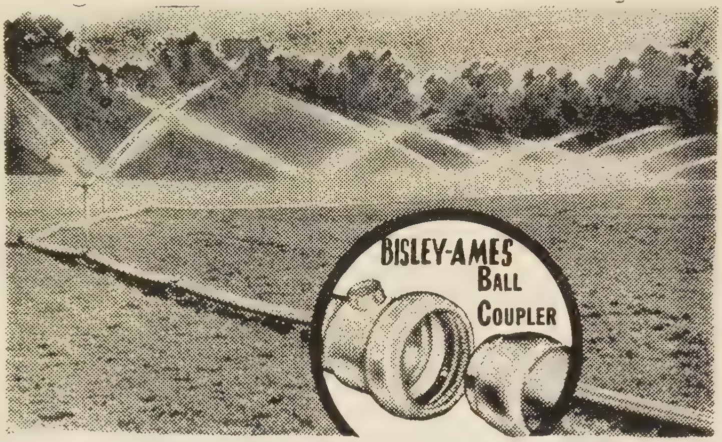

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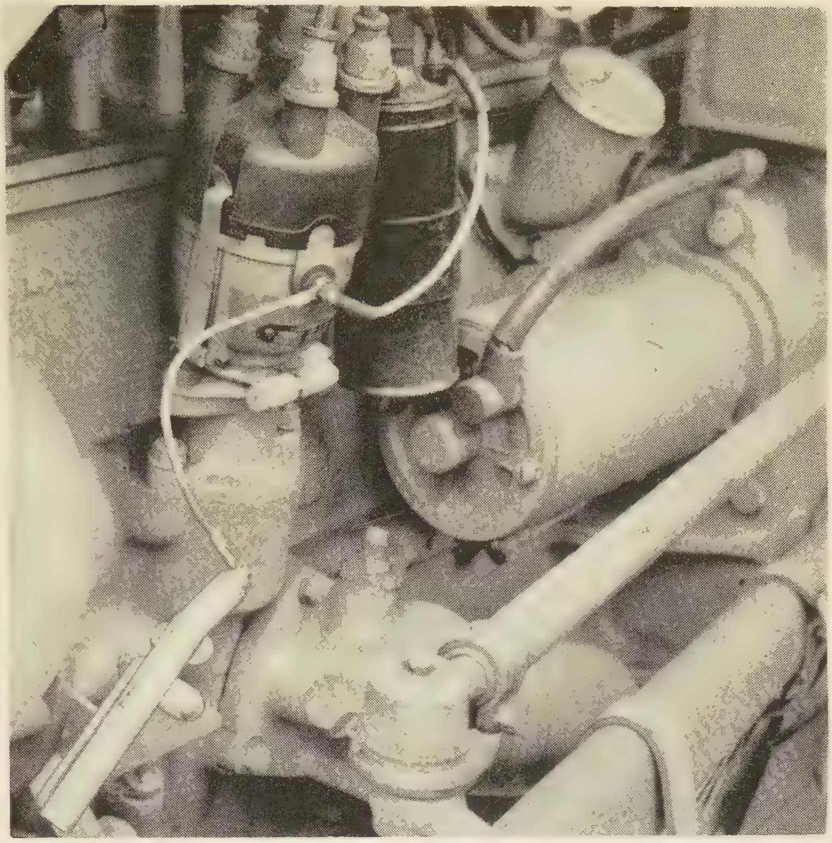
ing to get clear (an unsafe slope). An ideal device would measure ahead and tell the operator what class of country he would be driving on in say 10 seconds, but for this electronic equipment, which is too expensive, would be required.

2. All angle indicators must be calibrated for the make and model of tractor to which they are fitted and must be preset for the safe angle of this tractor. This presumes a knowledge of the tipping angles (both static and dynamic) and the location of the centre of gravity of the tractor. Unfortunately this information is not readily available for the makes and models at work. Few manufacturers publish such data and though some, when approached, have made the information available, others have not. Unless these data are available a guess as to a tractor's safe angle could be hazardous.
3. Some of the devices cannot have the safe-angle setting discounted to provide for the smaller tipping angle of tractors fitted with ancillary gear such as loaded buckrakes and front-end loaders.

At least two angle indicators have been manufactured and sold in New Zealand, but they did not meet with a ready market and in recent years their sale has been discontinued. Many devices have been patented, but inventors find difficulty in having them manufactured because of the likelihood of limited sales.



Mercury switch (bottom left) designed to short out the tractor's ignition system at a predetermined angle to prevent the tractor's going on to a steeper slope and somersaulting backward.

Other Safety Devices

There are numerous devices apart from those that indicate the slope which aim to protect the tractor operator. Some of these are:

"Killworth" Knee Grips

"Killworth" knee grips are an Australian invention. They are fitted to the dashboard to combat the risk of the driver's being unseated when operating on rough country and to give a sense of greater security. The driver clamps his knees into these grips as he would into the grips on a saddle, and they seem to be remarkably effective for their purpose.

Preset Steering

A locking device on the steering column that can be set to lock the steering wheel at any predetermined position has been manufactured and sold in New Zealand for some years. This unit has a place on the one-man dairy farm and is used quite widely to steer tractors straight or in a wide circle while the operator feeds out hay, silage, turnips, or greenfeed from the trailer.

Unfortunately the operator has to get off a moving tractor after it has been set and mount a moving tractor to regain control after he has fed out a load. But the tractor is travelling slowly and the technique is likely to appeal to those who are agile. There have been mishaps, however, such tractors having gone through fences, into drains, and over banks while the operator faced rearward, but no driver has yet been killed.

The fitting of this device to a tractor on a one-man farm is certainly preferable to the common alternative of allowing a young child to drive the tractor during feeding out.

How 221 Fatal Tractor Accidents Happened in 11 Years (1949-59)

52	Crawler tractors	30	rolled over
		7	somersaulted backward
		6	unseated driver
		5	ran over driver or child
		3	miscellaneous
		1	somersaulted forward
169	Wheeled tractors	98	rolled over
		17	ran over driver or child
		16	somersaulted backward
		10	drivers pinned or crushed
		9	somersaulted forward
		6	drivers fell off
		6	unseated drivers
		4	miscellaneous
		3	caught in power take-off shafts

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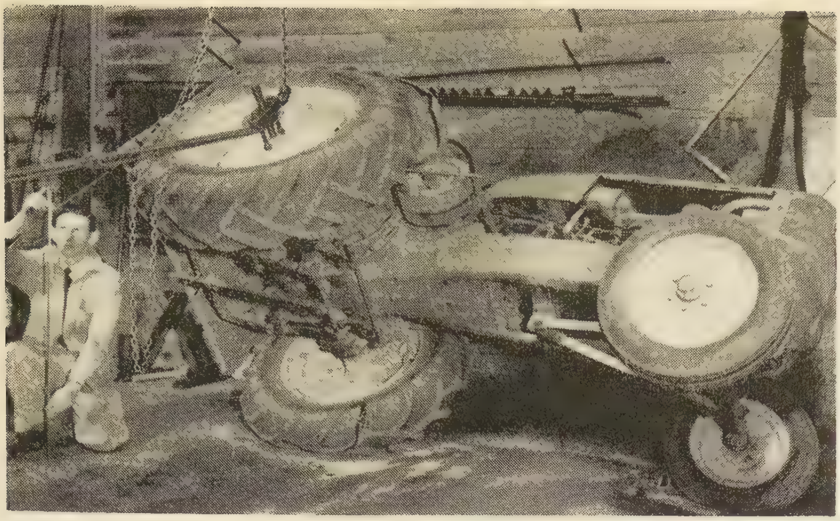
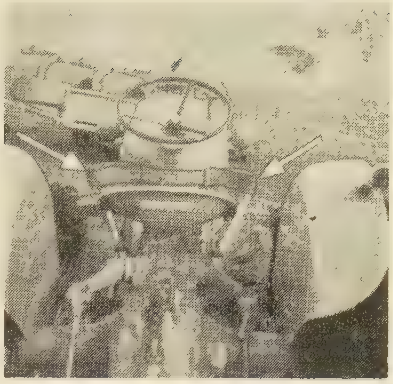


[Standish and Preece

A test to establish the approximate static tipping angle of a tractor. Until the static and dynamic tipping angles of all makes and models are known, only a guess can be made of the tractor's safe angle for presetting warning devices.



↑

"Killworth" knee grips (indicated by arrows) fitted to the tractor's dashboard give the operator greater security when rough country is being worked.

↓

Wheeled Transport Tray

For feeding out on a one-man farm there is also available for three-point linkage tractors a transport tray that has two wide roller-type wheels under the frame. In the up position this tray can be used to transport heavy loads at higher speeds, but when the tray is down the wheels roll on the ground and the tractor becomes virtually a six-wheeled, three-axle unit that tracks straight ahead, even on reasonable slopes. A small platform shields the space between the linkage members so that the operator can climb back over the rear axle with some safety to feed out.

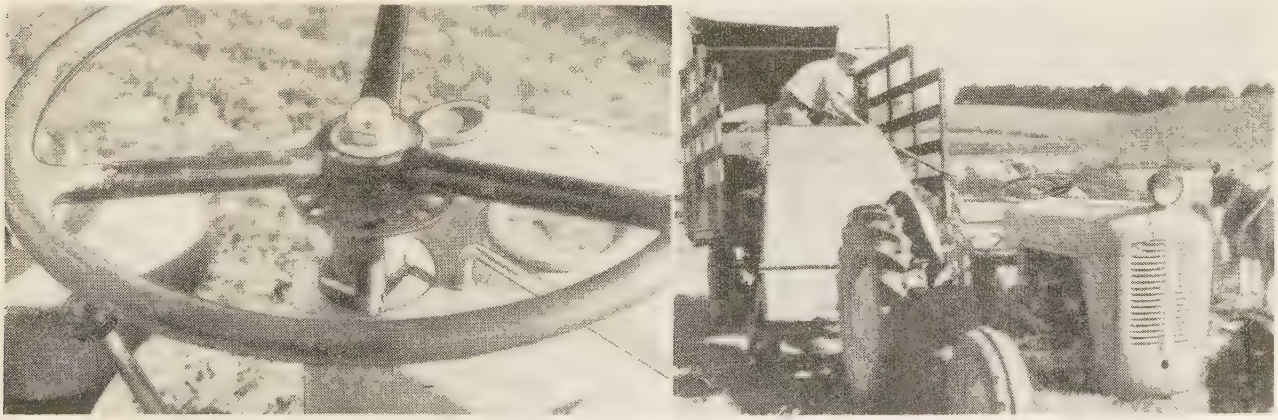
"Shaw" Stabiliser

An Australian inventor has patented and produced an extended rear axle which terminates in steel wheels fitted with car tyres which normally ride about 12 in. above the ground. This unit, which is sold for about £A80, is designed to prevent tractors rolling over when driven on to slopes that are too steep. It has been tested in Australia.

When a tractor equipped with this attachment cants over on a steep slope the point that hits the ground is a rolling one, so that there is nothing to automatically retard forward speed. The tractor would continue forward as a tricycle unit. In New Zealand, where many fields on plateaux or ridge tops are worked, a unit in such circumstances would continue down the long steep slope to the gully floor below, gathering speed as it went and the driver would be unlikely to escape injury.

Side-mounted Sprags

Several years ago a New Zealand inventor Mr J. O. H. Tripp, of Outram, marketed at no profit to himself a side-mounted sprag for wheeled or crawler tractors. It consists of a heavy steel framework that is braced forward and from side to side and can be folded up for road or tractor work along fencelines.



The preset steering device (left) enables the tractor's steering wheel to be locked for travel straight ahead or in a circle during feeding out (right).

TWO OF NEW ZEALAND'S MOST POPULAR FARMING GUMBOOTS

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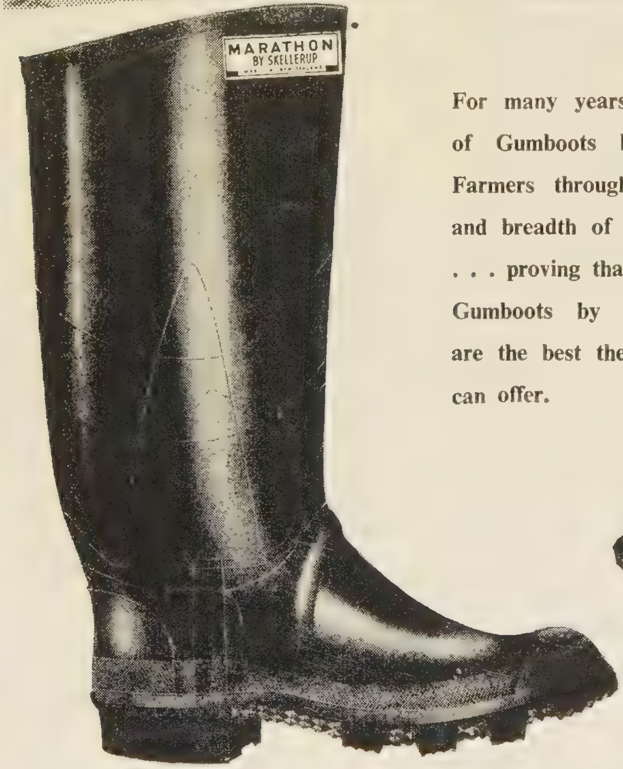

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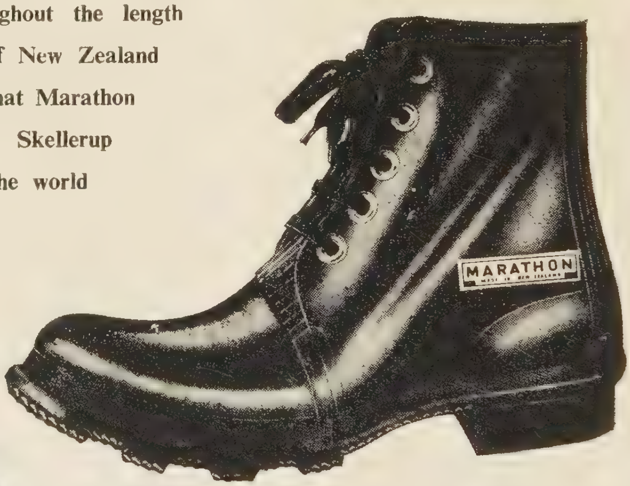

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MARATHON *Gumboots*

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The attachment, which retailed for £80, proved effective in field tests. Several units are reported to have saved operators working steep country from injury. This device, which is mounted on both sides of the tractor, has the advantage that the sprag digging into the ground effectively stops the tractor's forward motion. Control of the overturned tractor can be regained by engaging low gear, braking the top rear wheel, and driving down and round until the top wheel comes back on to the ground.

Another local invention on similar lines—not yet manufactured—consists of sidemounted sprags which are normally carried folded upright but which are released into the down (working) position by a trip mechanism actuated automatically when the tractor reaches a predetermined angle.

A third similar mechanism is "Rose's" explosive sprag, which has been field tested, but not manufactured. It consists essentially of two steel tubes under the tractor's frame containing rams pointing to each side of the tractor. The rams terminate in sprags and are extended by the firing of a small charge of gelignite by an electrical detonator as a result of closing a circuit from the battery by a preset ballbearing or mercury switch.

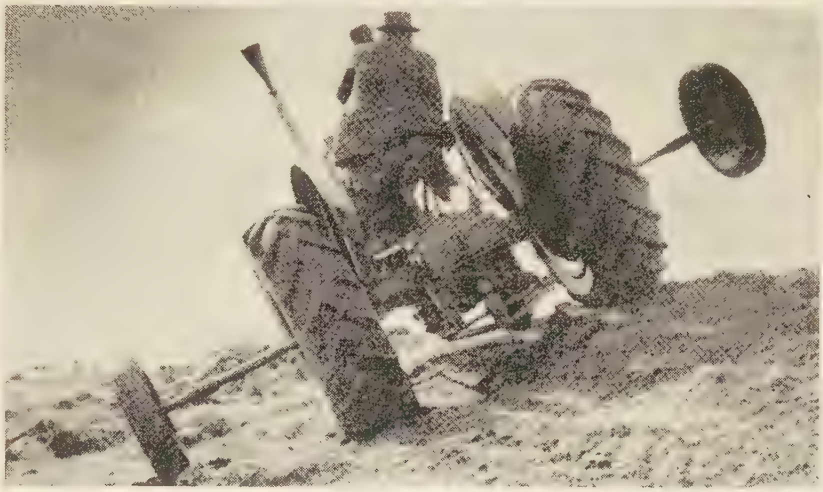
In field tests the prototype of this device prevented the tractor rolling on quite steep slopes at various speeds.

Even if production models were up to the standard of the prototype, they would, with continued field use, have to be tested periodically (say at engine oil change times) to check the electrical circuits. The best way to do this would be to trip the switch manually to fire the charge. Stocks of gelignite and electric detonators would have to be kept to recharge the unit and some would have to be carried on the tractor, because the device might sometimes fire owing to the sway of the tractor on rough, steep ground. All this explosive material on a farm that normally has none is not conducive to safety, especially with children.

Cabs and Safety Frames

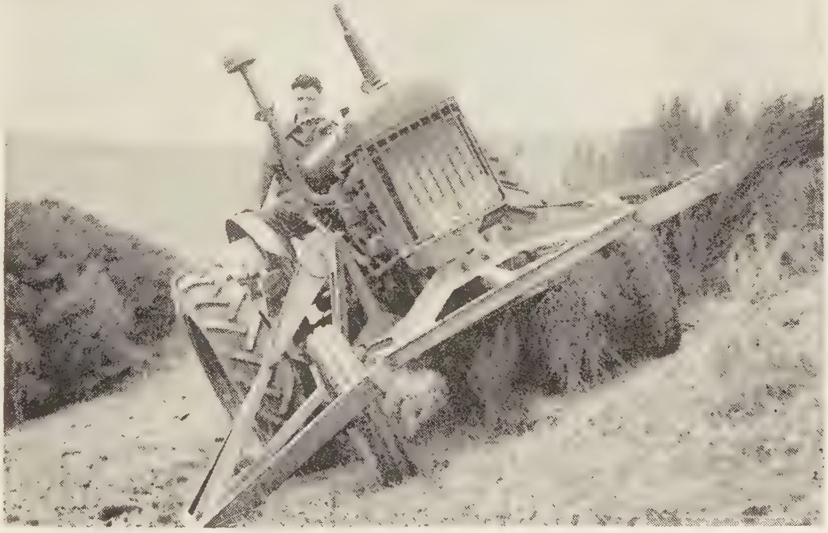
Tractor cabs or frames of various shapes are available. The cabs at present sold in New Zealand for wheeled tractors are not designed to withstand the heavy forces of an upset. They must be regarded purely as weather cabs. On the other hand there are a large number of open cabs on crawler tractors at work in the bush in New Zealand. These cabs, which are designed to prevent dead branches and trees from falling on to the driver, are remarkably efficient; so much so that though there is no legislation compelling their use, logging firms provide them and most operators will not drive a crawler in the bush unless it is so equipped.

The wheeled transport tray is another device that assists feeding out on a one-man farm.



[*"Austral News"*

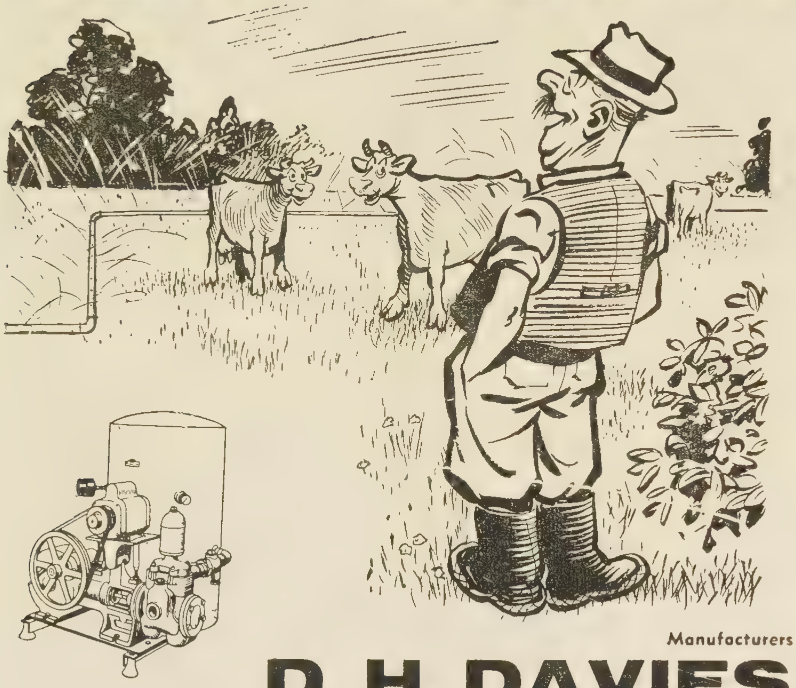
The "Shaw" stabiliser will prevent a sideways roll on short slopes, but its wheel contact with the ground could lead to trouble on long slopes leading down into deep gullies.



[*"New Zealand Farmer"*

Tripp's outrigger, built to prevent sideways rolls, was proved effective in field tests about seven years ago. A few of these attachments have been sold and are reported to have saved lives.

DAD and DAVIES ON THE FARM



500 Series No.C.4

Dad's production always dropped during Summer until he conceived the brainy idea of using a Davies pump to give him pressure on an irrigation system. Boy! — now isn't Dad proud! Returns keep up . . . the cows are happier . . . and Dad's well on his way to being in the big money. There is nothing like having water under pressure on your farm, and for a good irrigation system a Davies Series 500 will give you all the pressure you need over the whole farm. It costs nothing to get details, so why not write to us or our Agents now?

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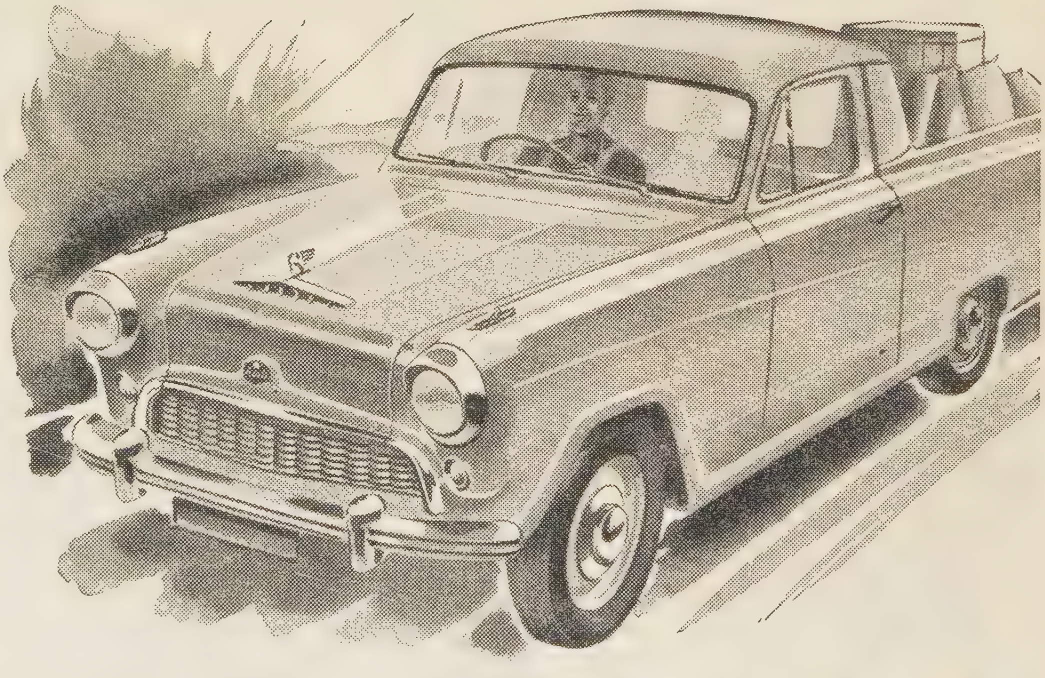

The sleek handsome look belies the rugged strength and load capabilities of the brilliant AUSTIN HALF-TON PICK-UP. All-steel unitary construction with ribbed steel inner panels to the really capacious tray; full-vision windows; wide bench seat takes 3; 4-speed gear box; lively o.h.v. performance; powerful hydraulic brakes. This stylish AUSTIN is top value in its field and carries a 12-month warranty.

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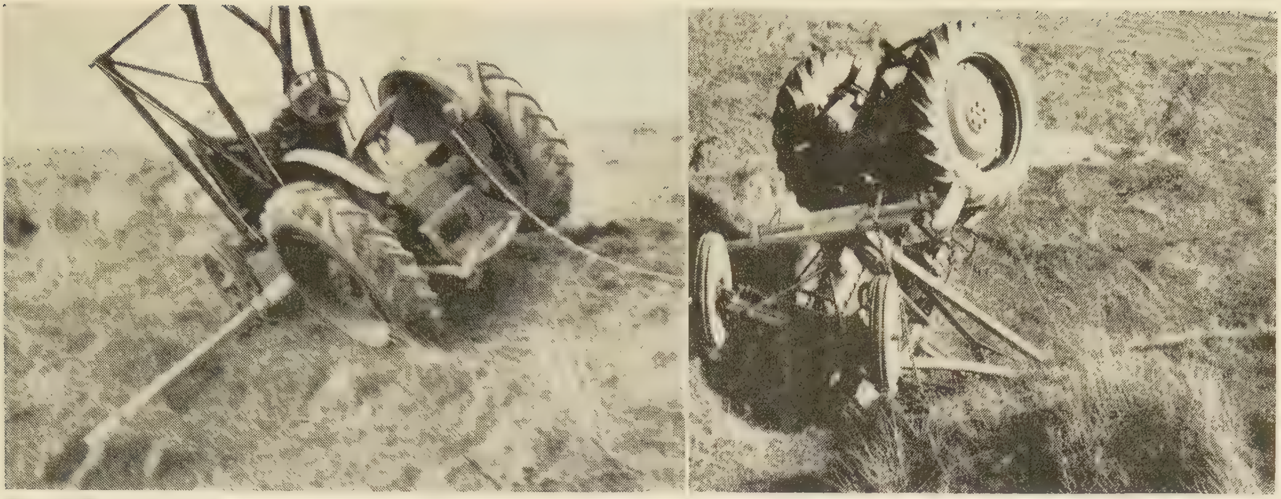
10 CWT. PICK-UP



"Rose's" explosive sprag successfully stopped the tractor's sideways roll on steep slopes, but when the device's switch failed, it did not. (This tractor is also fitted with the author's anti-roll device.)

Contractors and farmers developing scrub land would be wise to follow suit because in recent years at least two operators have been killed in accidents involving heavy scrub.

Swedish Safety Cab

With money provided by an insurance company the Swedish Institute of Agricultural Engineering built a safety cab designed to protect the operator in a backward somersault or side roll of a wheeled tractor. This unit was successfully field tested and reported on in 1954.

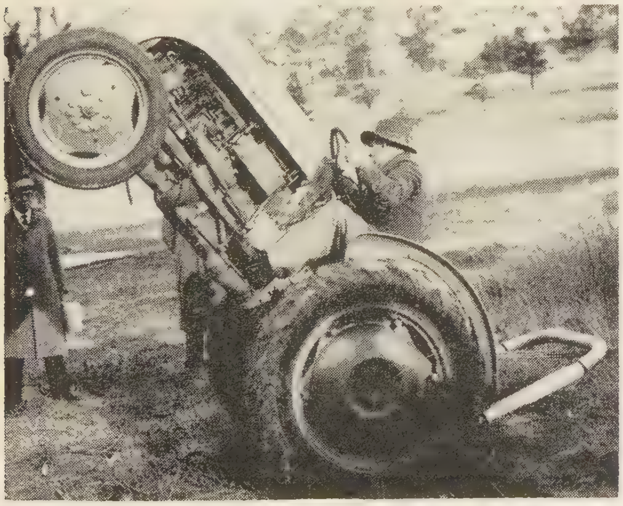
Since 1 July 1959 Swedish regulations have required new tractors sold in Sweden to be equipped with a safety shelter for the driver, preferably a crash-proof cab. Such cabs or frames can be tested at the Swedish State Agricultural Machinery Testing Institute, being submitted to blows on the rear and sides from a heavy pendulum, the force being proportional to the size of the tractor. In addition the cab is submitted to vertical compressive forces equal to twice the weight of the tractor. The cab must not deform to the extent that risk of personal injury is increased.

Californian Safety Frame

An investigation of tractor injuries and insurance company records in California led to the conclusion that driver education alone was insufficient to prevent accidents; it was necessary to protect operators from the consequences of their own misuse of tractors. One solution was to hold the driver in his seat and protect him by a frame from impact.

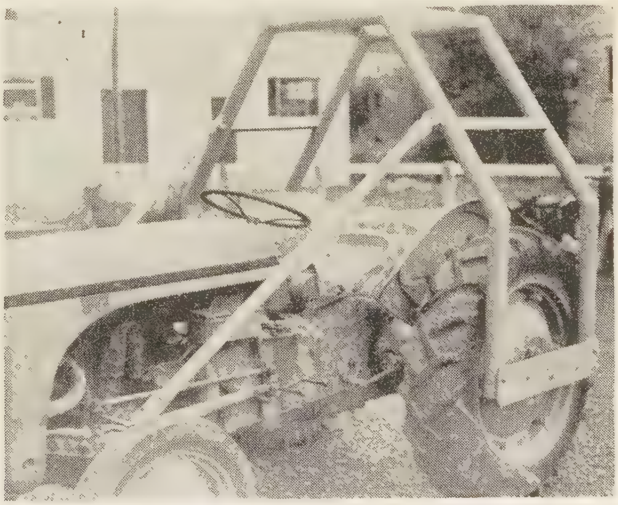
With assistance from an insurance company and a tractor firm the Department of Agricultural Engineering of the University of California built a driver safety frame. It was field tested and detailed plans for two different tractors were produced.

The driver safety frame consists of a heavy pipe framework mounted on the tractor's rear axle and braced to the top of the differential housing near the base of the top link of the three-point linkage. From its top a rear-



[*"The Mercury"*

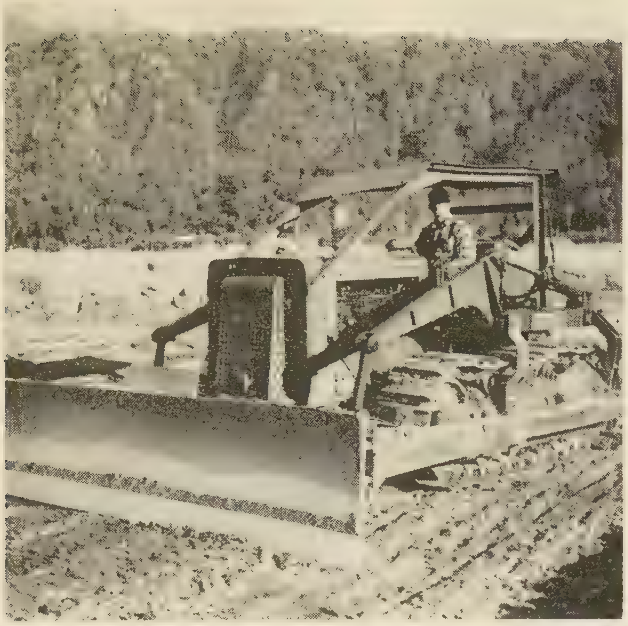
The Alexander safety bow is designed to prevent backward somersaults, to provide some clearance for a trapped driver, and to offer some resistance to a roll past 90 degrees.



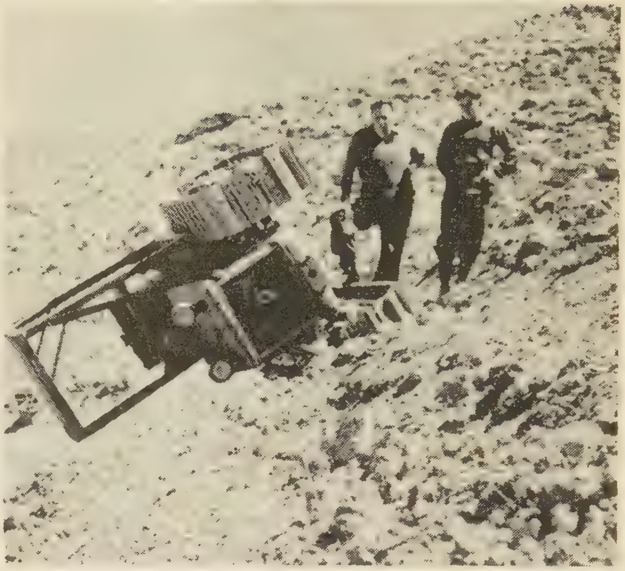
[*J. G. Furness*

"Kayef" safety frame. Two of these have been built and sold by a Blenheim engineering firm. A safety belt is recommended as an additional safeguard.

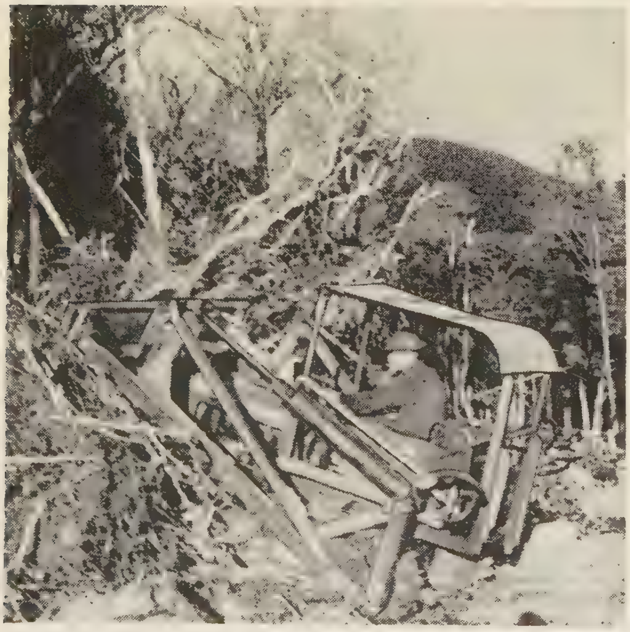
CABS CAN BE LIFE SAVERS



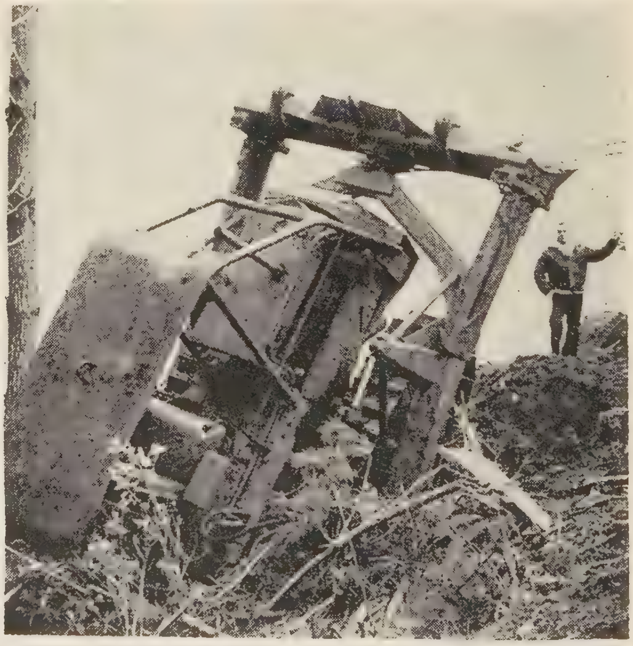
This bulldozer, which does a lot of roading in the bush, has a heavy bush cab to prevent dead limbs and rotten trees from falling on the driver. Bush vines often become entangled in the blade and pull down such dead material.



This weather cab saved the driver from being crushed in a low-energy roll when he hit a stump on ground which had been ploughed out of scrub. The driver crawled out and suffered only a shaking.



Only a week before this photograph was taken of this machine in South Westland a tree fell across the bonnet and broke off the exhaust pipe. The bush cab's front stanchions stopped it from coming back on to the driver and prevented injury. Farm operators working among scrub and trees should fit such cabs, as at least two farm tractor fatalities have been caused by falling debris.



[*"The Daily News"*

The bush cab saved the driver (right) of this bulldozer from being crushed when the machine somersaulted backward. The cab was made from 3 in. steam pipe and eighth-inch-thick steel plate.

ward projecting sub-frame prevents the tractor from pivoting more than 90 degrees in a backward somersault.

The designers insist that the operator should be strapped into his seat with a safety belt.

Alexander Safety Bow

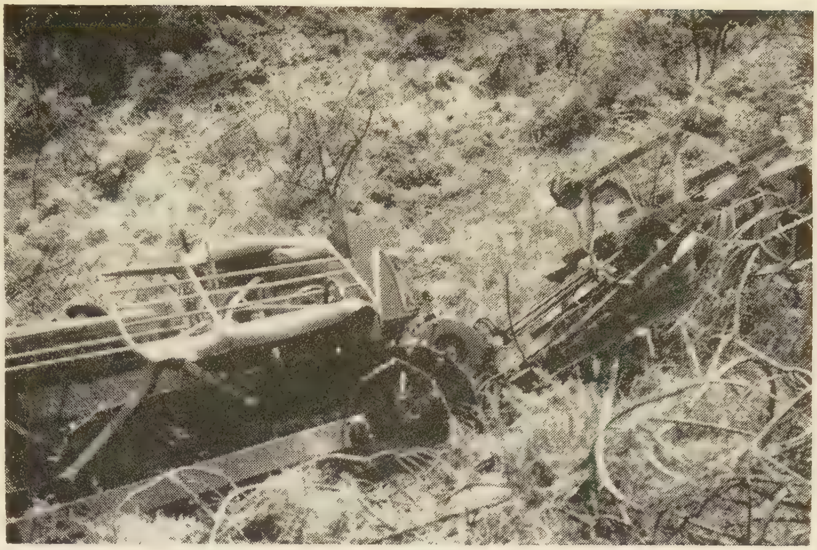
A Tasmanian has produced a safety frame, known as the Alexander safety bow, for which he has not claimed patent rights. Mounted on the rear axle, it consists of a single heavy pipe member that is bent to form a frame extending upward and to the rear from one axle to the other. The primary object is to protect the driver in backward somersaults. In addition it raises the rear of the tractor from the ground in a sideways roll, providing some clearance for a trapped driver and a little resistance to rolling past 90 degrees.

"Kayef" Safety Frame

In 1954 a Blenheim engineer produced a safety frame for about £55, two units being sold. It consists of two heavy pipes arched over the driver's seat and welded to a heavy plate pivotally mounted on the rear axles outside the wheels. It is braced to the front of the tractor. A safety belt is recommended.

Author's Anti-roll Device

The writer became interested in safety frames some years ago when analysis of New Zealand wheeled tractor fatalities showed that 58 per cent resulted from machines rolling over sideways. Forward somersaults were fairly rare (5 per cent) and backward somersaults (9 per cent) could be easily, if somewhat awkwardly, prevented by fitting two members of adequate size and length which projected back on either side of the tractor's drawbar.

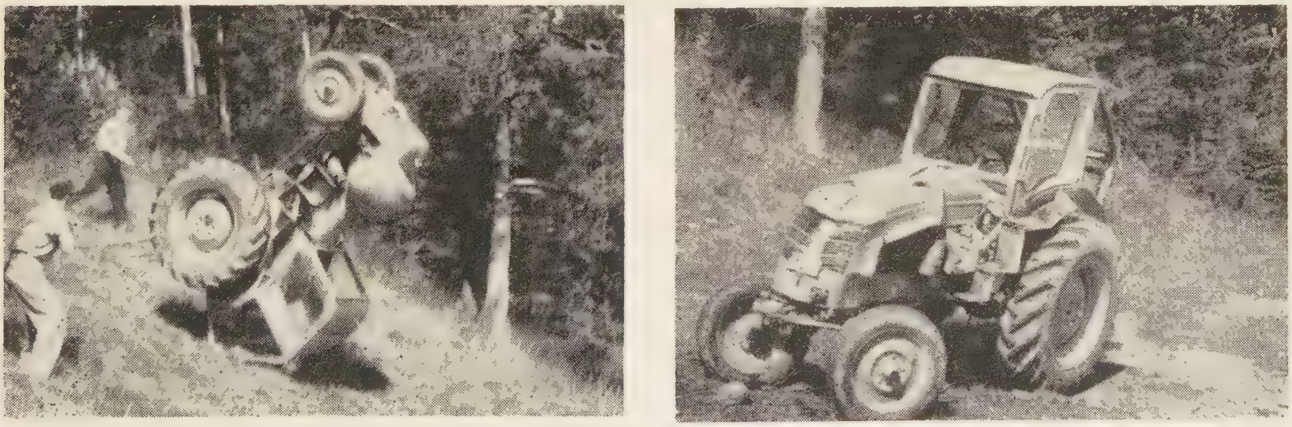

The weather cab on this crawler tractor did not prevent a high-energy roll over during giant discing of a hillside. The driver was killed.

Analysis of dozens of detailed tractor fatality reports showed that few if any of the drivers in a roll-over accident were injured in the first 90 degree roll, but that there was a grave risk of serious, often fatal, injuries when the tractor rolled a further 90 degrees and landed upside down. The writer therefore concluded that a framework which would prevent a tractor rolling more than 90 degrees should help materially to reduce tractor fatalities.

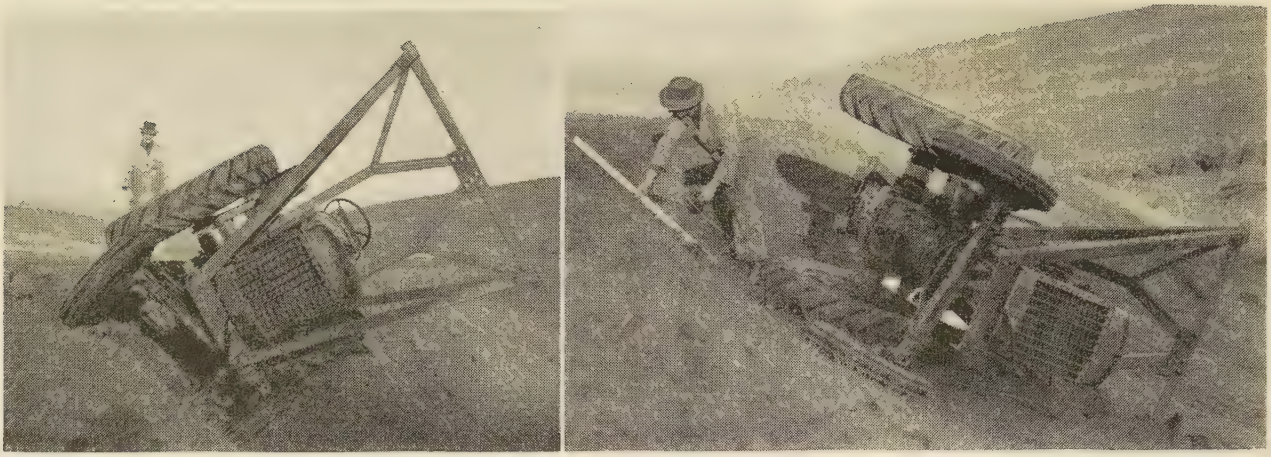
It was further felt that it was essential to have a frame that could be mass produced fairly cheaply, because otherwise it would not be used extensively and there would be insufficient protection of tractor drivers generally to reduce the number of serious accidents.

The author believed that New Zealand tractor drivers would not favour seat safety belts, because a vast number of tractors are used here as "iron horses" and the driver is on and off them many times a day. It was considered preferable to keep the frame away from the tractor seat and it was fitted to the side mounting pads of an old tractor and braced forward. This did not appreciably affect the vision from the driver's seat.

The idea of the frame was developed by the author, and the engineering design work was done by members of the staff of the Agricultural Engineering Department, Canterbury Agricultural College, and the School of Engineering, University of Canterbury.

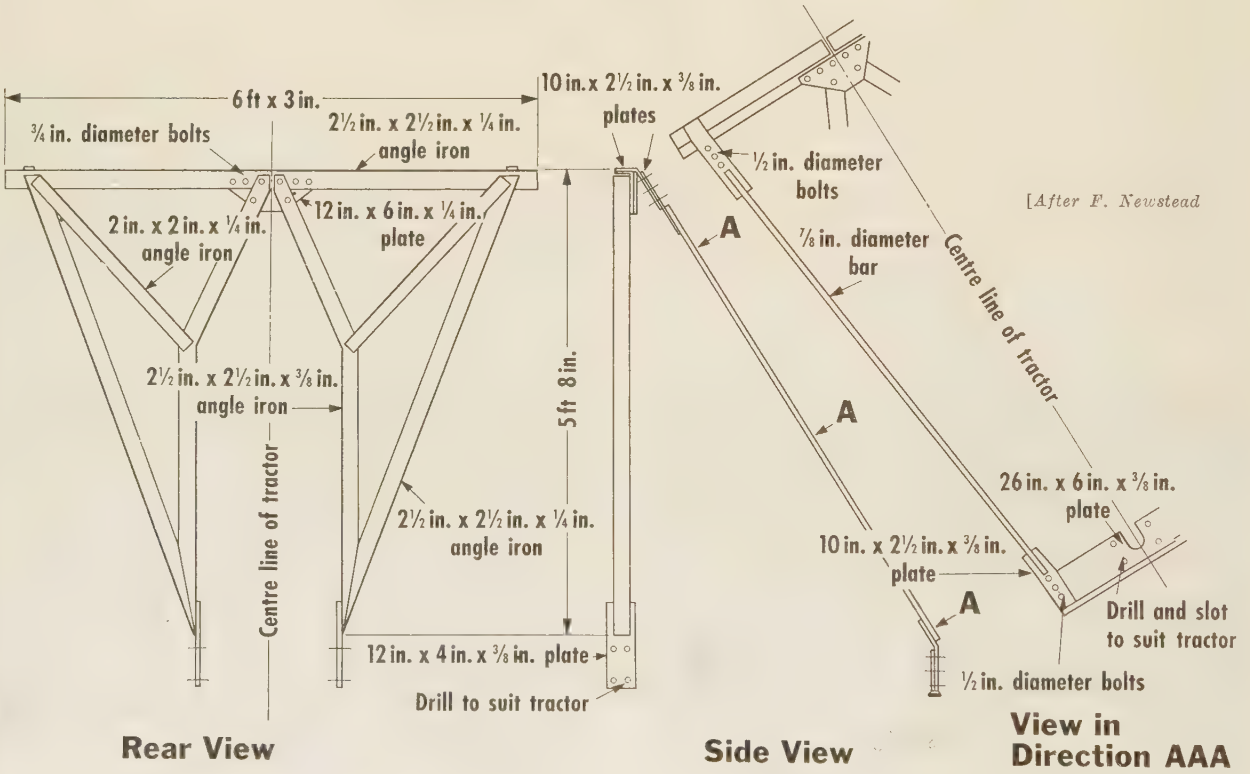

Field testing of a Swedish safety cab designed to prevent injury to the driver in a somersault or roll over. Recent Swedish legislation has made compulsory the fitting of such cabs or other safety shelter to new tractors.

ANTI-ROLL DEVICE



[*R. C. Blackmore photos.*

In 24 tests out of 28 the anti-roll device stopped the tractor at a 90-degree roll. As the frame is well forward of the driver, there is plenty of clear ground below the tractor on to which the driver can jump or be thrown from the seat. No safety seat belt is needed and the important thing is that after a roll over, the tractor does not roll a further 90 degrees on to the driver, who may land awkwardly and not be able to run clear. The illustrations show a roll checked on a steep slope (40 degrees). The sharp point of the frame has dug into the ground and the tractor has not slid downhill (on to the position where a driver might be).


6 ft x 3 in.
¾ in. diameter bolts
2½ in. x 2½ in. x ¼ in. angle iron
2 in. x 2 in. x ¼ in. angle iron
12 in. x 6 in. x ¼ in. plate
2½ in. x 2½ in. x ⅜ in. angle iron
Centre line of tractor
2½ in. x 2½ in. x ¼ in. angle iron
5 ft 8 in.
12 in. x 4 in. x ⅜ in. plate
Drill to suit tractor
Rear View
10 in. x 2½ in. x ⅜ in. plates
½ in. diameter bolts
A
⅞ in. diameter bar
Centre line of tractor
A
26 in. x 6 in. x ⅜ in. plate
10 in. x 2½ in. x ⅜ in. plate
A
Drill and slot to suit tractor
½ in. diameter bolts
Side View
View in Direction AAA

[*After F. Newstead*

Structural details of anti-roll device. It was designed for a tractor weighing 6,000 lb and an impact force of 2 g.

A frame was built and field tested by the writer. The tractor was driven on to a slope or flat adjacent to a sudden change in slope, the steering tied, a gear engaged, the clutch engaged by remote control, and, after the roll, the motor switched off by remote control. The first frame was tested in this way 20 times on slopes of from 20 to 40 degrees at various speeds, and once in the actual situation where a tractor driver was killed. Only twice did the first frame fail to arrest the tractor after it had rolled through 90 degrees; on these occasions it rolled 270 degrees into a gully.

In view of these experiments and because the original frame suffered little deformation in the field trials a second, lighter but adequate frame was built to reduce the amount of metal in it and therefore the price. The lighter frame was field tested eight times at higher speeds on hard, dry ground on slopes up to 36 degrees. On only two occasions did it fail to perform as desired. The frame could be mass produced for about £30.

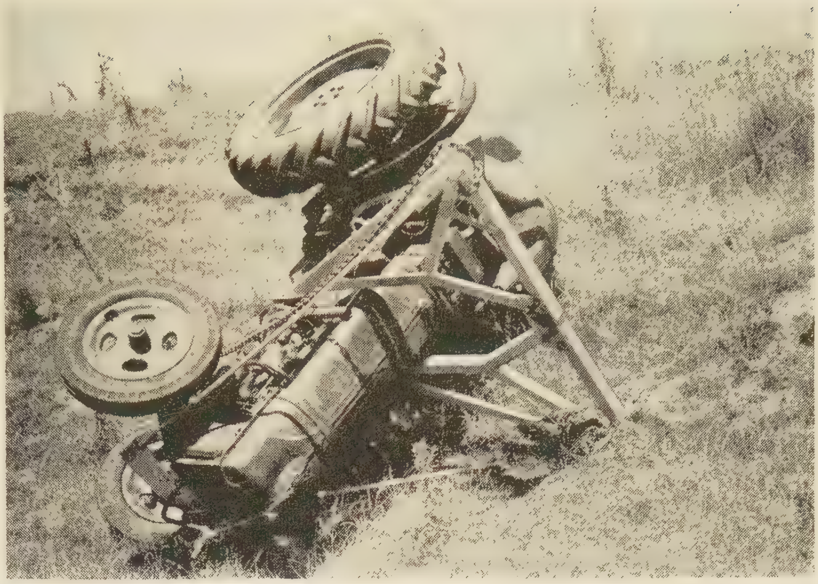
Thus in 24 of 28 field trials on foothill country on slopes ranging from gentle to very steep and on sudden changes in contour, the device successfully arrested the tractor at a 90 degree roll. A feature of this frame is that on impact the point of the frame enters the ground, no matter how hard it is, and thus kills the forward motion of the tractor and prevents it from sliding down the slope on to the operator or into a gully. A driver of a tractor so fitted would survive a roll-over accident six times out of seven—much better chances than he has at present.

In all the 28 field trials the total damage to the tractor amounted to only one broken radiator guard, two broken trunnion stops for the front axle, three bent rear wheel pressed steel centres, and minor buckling of the rear mudguards and petrol tank. The device was worth its cost for preventing the damage normally associated with 28 rolls apart from any saving of injury to the operator.

The Department of Agriculture is not claiming patent rights for the anti-roll device. It will be pleased to give any further information to farmers or manufacturers wishing to make it.

Devices Offer Some Worthwhile Protection

People throughout the world interested in tractor safety have realised that education by itself has been insufficient to reduce the incidence of tractor accidents markedly and have accordingly produced and done some field testing of devices to minimise injuries received in tractor upsets resulting from faulty handling.



A lighter anti-roll frame was built after the original device had suffered no harm in 20 rolls. The lighter frame, which is shown here after a high-speed roll on a 26 degree slope of hard, dry soil, was tested eight times.

However, safety devices are not a panacea for all hazards associated with tractor operation. In some situations they will do little or nothing to reduce the danger to the driver.

- They will do nothing for the operator who drives off a bridge or bank and is drowned in a creek, stream, or river.
- They will do nothing to prevent children who are allowed to ride on tractors at work from falling off and being run over either by the tractor or a towed implement.
- They will do little or nothing for the operator who drives off a nearly level path on to really steep country or over a vertical bank. (They will, however, greatly reduce the risk of injury to an operator who has a tractor upset on easier country.)

There are now sufficient promising devices to allow a prudent tractor owner to choose one that suits his tractor and type of work and guards against risks likely on his farm. Unfortunately no one so far appears to have manufactured or tested a device for crawler tractors that would prevent injury to drivers in an upset. However, the same principles as in the design of wheeled tractor devices would apply, but allowances would have to be made for the greater weight of crawlers.

Safety Belt Essential with Some Types

Those who might choose a safety device consisting of a number of frames or members close to the tractor driver must see that a safety belt is used. Unless this is done, an operator could be thrown wildly about the "cage" if the tractor rolled down a steep slope. If this happened, one of his arms or legs might easily pass through one of the spaces between the members and be broken as the tractor rolled over. If this happened to his head, he would almost certainly be killed.

The spaces between members could be filled in, though sheet steel would not be satisfactory. The Swedish authorities report that their original safety cab was uncomfortably hot in summer and on occasions excessively noisy. Rubberised canvas has been mentioned as a suitable covering and wire mesh could also be used in the side spaces.

Conclusions

In various parts of the world valuable experience has been gained in the use of tractor safety devices and they could be adopted in New Zealand. A large number of tractor deaths in this country have occurred in circumstances where a device could have prevented all or some of the weight of a tractor from landing on the driver, thus saving his life.

CARNATIONS

for Market and Flower Garden

By J. P. SALINGER,
Horticultural Advisory Officer (Ornamentals),
Department of Agriculture, Wellington

CARNATIONS are one of the most popular flowers with florists and are required all the year round. The home gardener also finds them of great value both in the garden and for decorative work. This article describes the cultivation of perpetual flowering carnations mainly, as these are the most popular commercial types.

THREE main types are grown in gardens—annual, border, and perpetual flowering carnations.

Annual Carnations

The annuals, which have various names such as Chabaud, Enfant de Nice, or Marguerite, are comparatively low growing plants with large flowers. They are normally grown for bedding only, as the flowers are not usually as well shaped as the other types and the calyces tend to split.

Seeds are sown in late winter or early spring in boxes or pots and the plants are set out in late spring and allowed to grow and flower throughout summer. As the flower stems tend to fall over in wet weather, low brushwood stakes should be provided among the plants to support the stems. If dead heads are removed regularly, plants will flower until the weather becomes cold.

Border Carnations

Border carnations flower once only, in midsummer; these are the types frequently grown for exhibition. The flowers are perfect in shape in a variety of colours.

Perpetual Flowering Carnations

Perpetual flowering carnations, which flower throughout the year, are the type popular with florists. There are three main groups: the tall American types, exemplified by William Sim; the tall spreading English perpetuals such as Ashington Pink; and the shorter, more bushy types such as Frank Aldritt (Otaki Pink) and Rose Clove (possibly the same as Cupid). Others recently introduced include the border perpetual types raised in Britain and the Australian Melville varieties. Their possibilities for commercial cut flower production are not yet known, but they are suitable for garden decoration.

Perpetual flowering carnations can be grown outdoors all the year round in the warmer parts of the country, but for higher output of cut flowers they are best grown in glasshouses. The English and American types tend to grow tall and so are less suited for garden decoration, though they produce flowers for decorating the house; the dwarf varieties are of sufficiently neat habit to be planted in garden beds or borders.

Hygiene and Health

Carnations can be grown satisfactorily only where a high standard of hygiene is maintained. Healthy stock plants and disease free soil are essential and plant refuse and debris must be removed regularly and destroyed after plants have been handled. In addition, pests and diseases should be controlled or prevented by regular spraying or dusting.

Unless the soil used for commercial carnation growing has been obtained from a grass paddock, it should be sterilised with steam or chemicals, as carnations are very susceptible to soil borne diseases. Sterilisation is essential for growing on young plants or when a second crop of carnations is to be grown in the same soil.

Steam Sterilisation

Steam sterilisation is the most efficient method, as it controls insects, diseases, and weeds. Where glasshouse carnations are grown in beds these may be sterilised in rotation under heavy-gauge polythene sheets, using a harrow type grid. Sterilised soil does not then have to be moved on to unsterilised paths, etc.

Sterilisation with Chemicals

Chloropicrin is a good fungicide, a reasonably good insecticide, and gives control of some weeds. It is injected at 3 c.c. per square foot. Holes should be closed after injection; where tractor-drawn equipment is used the soil should be pressed down with a roller or heavy levelling boards.

Vapam acts as an insecticide and partial fungicide and gives good control of weeds. It does not control verticillium diseases. It should be applied as a soil drench at 1 quart to 100 sq. ft. It is less effective when injected.

Methyl bromide is not recommended. Carnations can be damaged and severely checked in growth by even slight traces of bromide. If methyl bromide is being used, which would be mainly for weed control, it should be applied only when soil temperatures are above 65 degrees F and the soil should be very well aerated before planting.

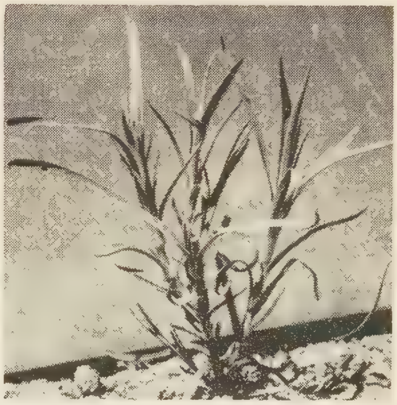
Soil Conditions and Manuring

Carnations grow well in many soils, but the best plants are produced in an open well drained soil enriched with organic matter. Organic matter can be provided by incorporating crushed sheep dags, well decayed compost, straw or stack bottom, or rotted cow manure for light soils.

Liming

Carnations need plenty of calcium, normally supplied by liming. Plants will grow satisfactorily in soils with pH levels between 5.8 and 7.0 provided calcium is available. Soil analysis will indicate whether or not lime should be applied.

Rooted cuttings of perpetual flowering carnations bedded out, before permanent planting in a glasshouse.



Perpetual flowering carnation plant stopped once. The growing point was removed and strong side shoots have grown out, making a bushy plant.

A border of Frank Aldritt (Otaki Pink) in flower in January.

Other Nutrients

In addition to lime carnations should receive at planting a manure containing 1 part of nitrogen, 1 part of soluble phosphate, and 2 parts of potash. This can be made up as follows:

	Parts by weight
Blood and bone ..	.. 4
Superphosphate ..	.. 1
Sulphate of potash ..	.. 1

This is applied as a base dressing at 4 oz to the square yard.

When plants are growing well during summer side dressings of fertiliser are required at six-weekly intervals. This should be made from dried blood (2 parts by weight) and sulphate of potash (1 part) applied at 2 oz to the square yard.

Propagation

Perpetual flowering carnations are usually propagated from cuttings. When these are taken from older

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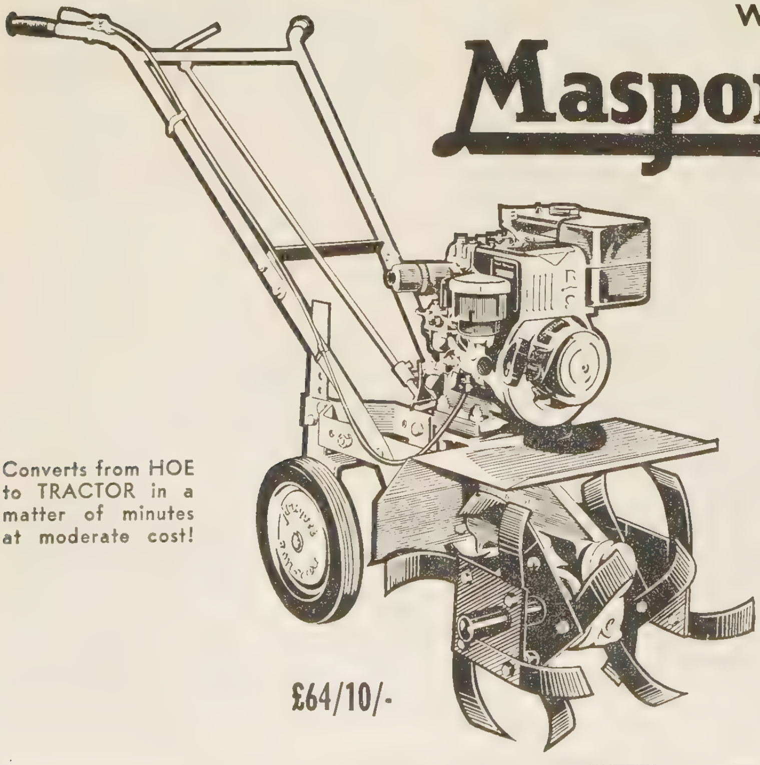

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plants they should be cut from the middle, as those from the base often do not flower freely and those from the top often produce weak plants.

Where cuttings are selected from young plants strong growing side shoots should be chosen.

Cuttings for home gardens may be taken from November to February and rooted in good garden soil in a shady position.

As the greatest demand for flowers is in winter, commercial producers take cuttings from May to July. The parent plants must be healthy and free especially of systemic diseases and leaf spots. (See section on diseases.)

A special propagating bed should be prepared and it must be insulated from soil where carnations have been grown previously. This bed may be prepared in a glasshouse, frame, or under cloches. It should be well drained and filled with clean, coarse river sand, by itself or mixed with perlite, vermiculite, or pumice.

So that cuttings take root rapidly the propagating bed should be maintained at between 60 and 70 degrees F. In colder weather it might be advisable for commercial growers to use electric bench heating.

Short shoots with about eight to 10 leaves should be snapped off the parent plant and inserted ¾ in. deep about 1 to 2 in. apart in the propagating medium. If the leaves are upright and firm, none need be removed from the base of the cutting. Rooting will be hastened by dipping the cuttings in proprietary root growth promoting hormones. After being inserted the cuttings should be watered and then sprayed at weekly intervals with the fungicide captan at 1 oz to 3 gallons of water.

Under good conditions cuttings should have rooted sufficiently within three weeks.

Growing on

The rooted cuttings can be grown on in three different ways:

- Set out in their permanent positions in the glasshouse.
- Potted up into 3 in. pots filled with the John Innes potting mixture No. 1; 1,000 pots require 7 bushels of soil.
- Planted out into specially prepared beds under well ventilated frames or cloches or in the open, the young plants being set out 3 in. apart each way. For 1,000 plants this spacing requires 14 bushels of soil and an area of 6 sq. yds.

Under the last two methods the plants will become well rooted and ready to transfer to other areas by about October. They should then be planted out in the following way:

Disbudding a shoot to obtain a single main flower. The bud to be retained is held while buds and shoots lower down the stem are removed.

Into their permanent positions in glasshouses or outdoors.

Into growing on beds at a spacing of 9 in. apart each way for permanent planting in January or February.

Stopping

Young cuttings tend to flower at a very early stage. Plants should therefore be "stopped" by breaking out the growing tip. This causes side shoots to appear and these shoots should also be stopped once subsequently. For winter flowers the second stop should have been done before the middle of February, as plants flower from 16 to 20 weeks from time of stopping.

Glasshouse Culture

The finest blooms and the heaviest production even in the warmer areas are obtained from carnations grown in glasshouses. They should be regarded as a separate crop grown on their own. Yields will be much poorer if they are grown in glasshouses with other plants which require different cultural conditions, and management difficulties and problems in pest and disease control are also created.

Glasshouse crops should generally be grown for two years only; otherwise the plants become too tall, crops are reduced, and pest and disease control becomes too difficult. However, crops can profitably be retained for a third year if exceptionally good and healthy.

Glasshouse Construction

The basic requirements in any glasshouse for carnations are adequate ventilation at all times; full light, especially in winter; and an average growing temperature of between 55 and 75 degrees F throughout the year.

A glasshouse constructed specifically for carnation growing should have high walls glazed almost to the ground, a good width to provide a high ridge, uninterrupted floor space, and some form of heating in the cooler areas or where frosts occur. Heating will also encourage air circulation and reduce humidity in cold, wet weather. Adequate ventilation can be maintained by providing vents along the length of the ridge, in the sides, and above each end. Louvres are best for the sides and ends.

To obtain good light, large panes (which should be kept clean in winter) and thin roofing bars should be used. Additional light in winter can be provided at the south side or end by lining it with light-reflecting aluminium insulation foil. Light shading will be required in summer.

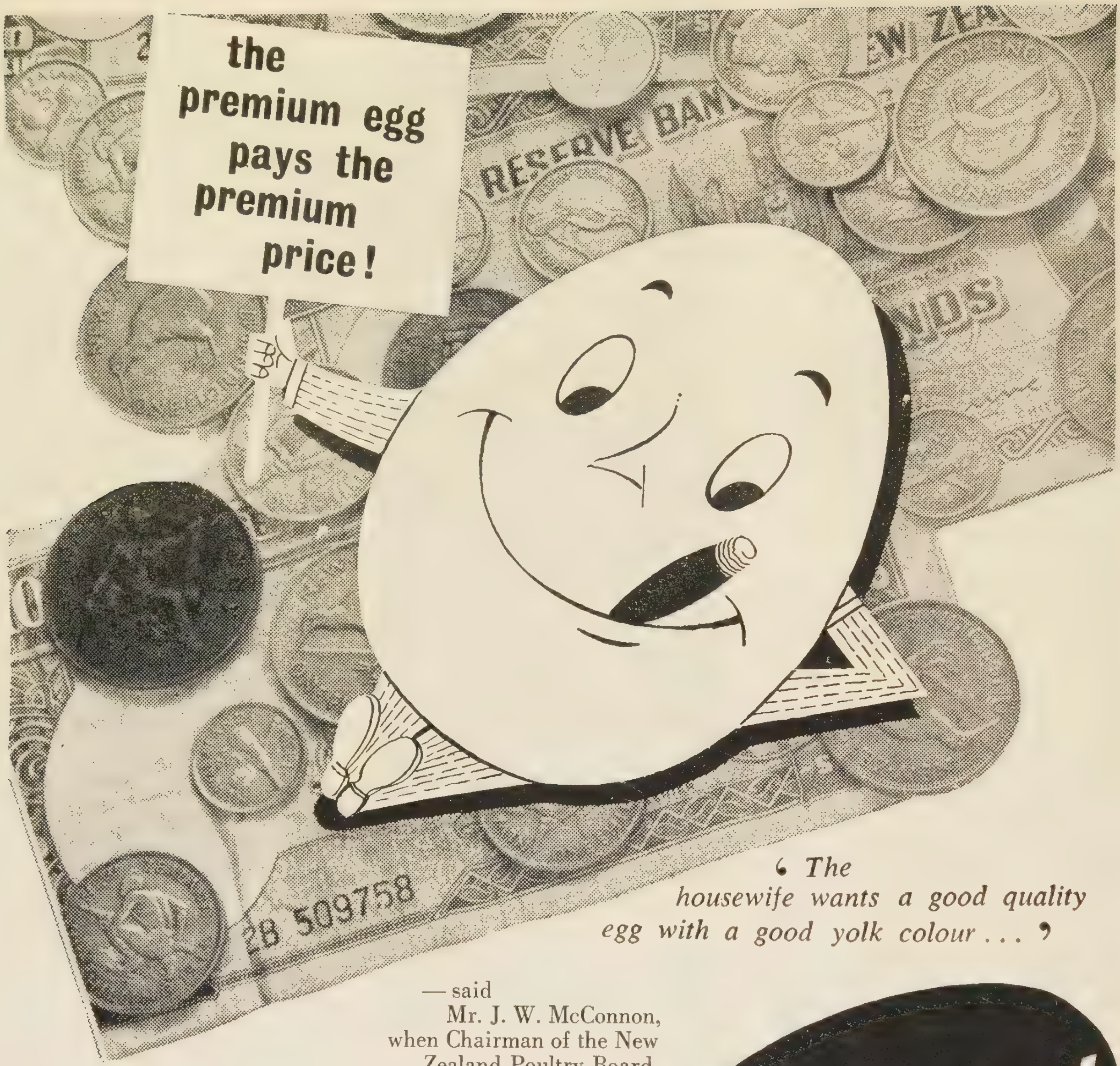
Heating is important for winter production. Where only occasional frosts and low temperatures occur temporary heating may be adequate. Kerosene heaters are suitable for small houses.

The traditional hot water system can be used. Pipes, if near ground level, should be carefully spaced to minimise interference with management. This problem can be overcome by suspending small diameter pipes above the plants. Heating by special high-voltage electric cables attached to the walls is also satisfactory.

Some Christchurch growers are now heating by hot air generated by an oil burning stove and blown by a fan through the house through large diameter polythene tubes suspended above the plants. The tubes have holes punched at 9 in. intervals. Unheated air driven through these polythene tubes will provide frost protection also.

Carnations can be grown satisfactorily in small unheated glasshouses provided there is adequate light and ventilation, but management is more difficult because temperature and humidity fluctuate more throughout the year. If the glasshouse has low side walls, it is suited only for the low growing varieties or for a one-year crop with the taller varieties.

In the warmer areas carnations are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grown under tall glass cloches or in polythene structures. With these adequate ventilation is essential. It can be provided best by leaving a gap between the sides and the top covering. Polythene will not prevent frost damage, but will protect the blooms from wind and rain. Glass cloches provide better protection from frost.

Layout in the Glasshouse

In a glasshouse carnations should not be grown in large areas on the floor, but in raised beds with side walls of concrete or rot-resistant timber 5 in. high. The number and size of beds will vary with the width of the glasshouse, but the following layout is satisfactory when plants are spaced at the recommended distance of 10 in. each way:

Paths 1 ft 9 in. wide; side beds (path on one side only) 2 ft 6 in., taking 3 rows of plants; main beds (paths on both sides) 4 ft 2 in., taking 5 rows of plants. If these distances are not suitable, it is better to vary the size of the bed than to set plants closer together.

Where a house is intended permanently for carnations the base of the beds can be concreted to make a trough 8 in. deep with pipes at the ends for drainage.

The paths should be of concrete (preferably) or covered with gravel or sawdust. They will then keep dry and clean and all plant refuse can be collected readily.

Support

All carnations need some support. Low growing ones such as Rose Clove require support mainly for the flowers, while the taller types need support for the whole plant, as they may grow up to 5 ft in two years.

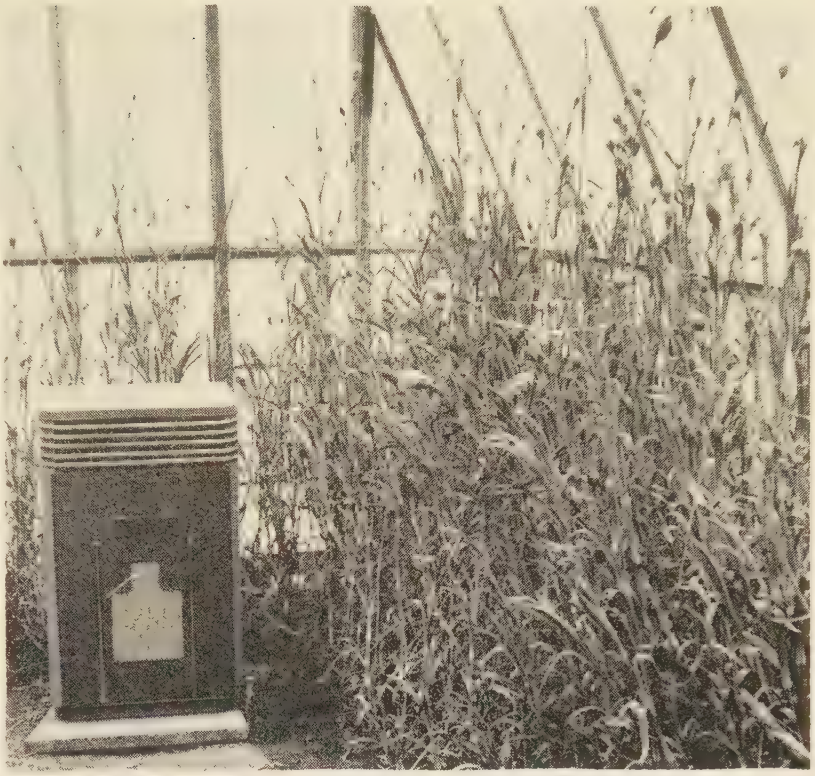
For small beds adequate support can be given by stretching large mesh wire netting over the beds and fixing this firmly to stakes at the ends and sides of the beds, but for larger areas it is necessary to put strong angle iron or pipe supports at the ends of the bed and at intermediate spacings along the bed and to fix cross-bars to these supports. Square-mesh netting (pig netting) can be stretched between these posts or 18 gauge wire used along the beds. String or a similar material can be cross tied to make a lattice work. The shoots and flower stalks are drawn through this lattice regularly during the year.

Soil in the Glasshouse

As carnations are grown for two years in the same soil, it should be open and friable. Addition of bulky manures or compost and peat and sand or scoria will assist in maintaining soil structure.

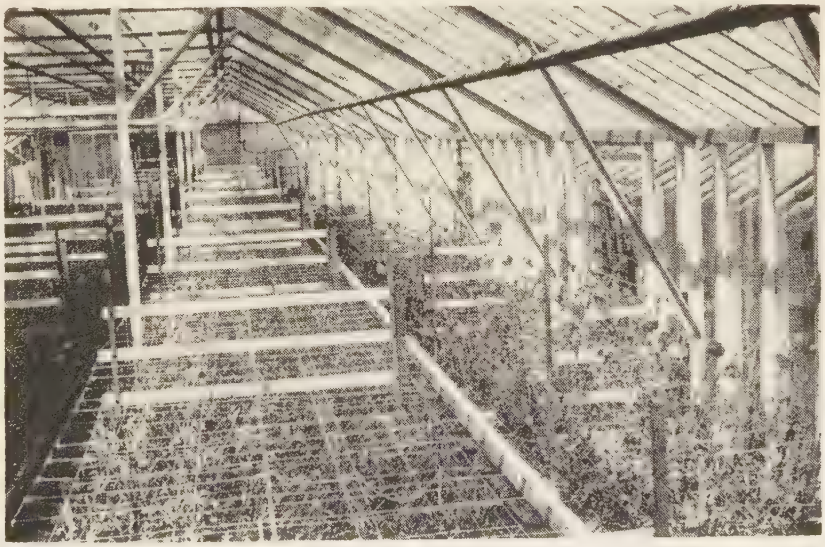
Unless the previous crop in the glasshouse was tomatoes, base fertilisers (and lime if necessary) should be added. Side dressings will be required when the plants are well established. After one year a base fertiliser should again be applied.

After one crop of carnations the soil should be sterilised, and bulky manure, sand, and fertilisers again added.



▲ Interior of small commercial glasshouse. The large panes of glass allow plenty of light. The plants of William Sim are supported by a wire and string framework. All potential flowers have been disbudded at an early stage. Frost protection is provided by a kerosene heater.

▼ Interior of large commercial glasshouse. The plants are grown in raised beds and the shoots supported by wire and string on wooden framework. Heating and water pipes are overhead. The side walls are glazed almost to ground level and side ventilation is provided by louvres.



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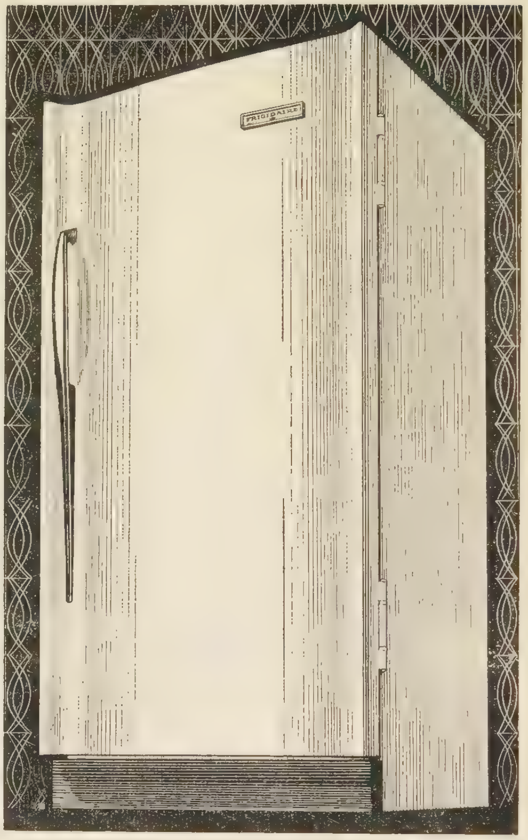

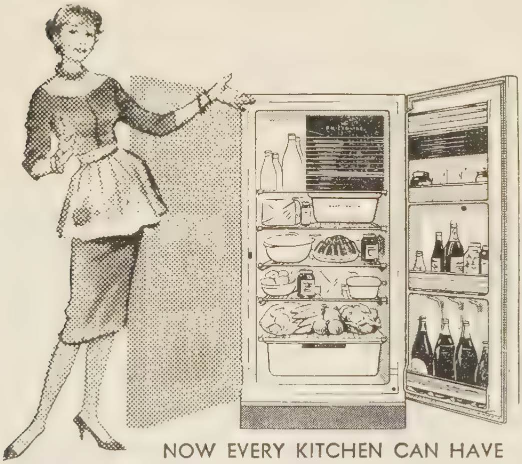

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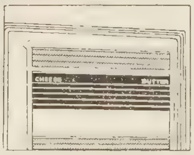

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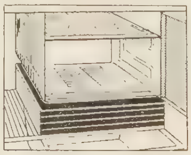

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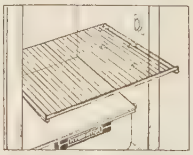

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The soil will need cultivating while the plants are small to remove weeds and maintain a surface tilth. Once the plants are touching each other this will not be possible and hand weeding may then be necessary.

Watering

Carnations grow best in a fairly moist soil and though the water requirements of this crop have not been determined, the soil should be kept moist at all times, especially in summer. Some water will be required even in winter; in heated houses this creates no problem, as heating will dry the atmosphere again. In unheated houses watering should be done in the morning on sunny days only and the ventilators left open until early afternoon to produce a drier atmosphere.

Water should be applied at soil level to prevent splashing the plants with soil thrown up from the beds and to reduce wetting of the foliage. Careless watering will induce infection by soil borne and leaf spot diseases.

Trickle-irrigation is ideal for watering carnations and is well worth considering for a commercial glasshouse crop.

Disbudding

As the flower stalks develop the main buds should be left and all side buds and small shoots for 15 in. down the stems should be removed regularly. All plant refuse should be cleared from the glasshouse as soon as this operation is completed.

Regular Spraying

Pests and diseases are best controlled by regular, preferably three weekly, applications of sprays, as then neither foliage pests nor diseases can build up.

For commercial growers a combination spray of parathion, methyl demeton, or schradan and zineb at strengths recommended by the manufacturers can be used. Home gardeners can use a combination spray of malathion and zineb.

Any wilting plants should be dug out immediately, not pulled out, with as much root as possible. The plants should be placed in a container, taken out of the house at once, and burnt. They should certainly not be left on a rough compost or rubbish heap. The soil should also be removed and burnt or, if left, drenched with copper oxychloride at 2 lb to 10 gallons of water applied at 2 gallons per square yard. (For further details see section on diseases and pests.)

Splitting of the Calyx

Splitting of the calyx is due to a check in growing conditions, especially to sudden lowering of the temperature as flower buds develop. Certain varieties are more susceptible to this trouble, but it can be reduced to a minimum by good cultural conditions and especially maintenance of temperature in winter at about 55 to 65 degrees F. A high level of soil nitrogen and alternate dryness and wetness will induce it.

If splitting is known to occur, small elastic bands can be put round the buds just before they open, though sometimes this is done after the flowers are picked. Varieties in which the calyx regularly splits should be discarded.

Outdoor Culture

In the warmer areas carnations flower satisfactorily when grown outdoors. A well sheltered site should be chosen and the soil built up into raised beds and manured with organic matter and a base fertiliser before planting.

Plants should be set out at their permanent spacing (15 in. apart) in March and April for summer and autumn crops and from October onward for winter crops. Where tall varieties are grown outdoors each plant will need staking. This is best done by training the plant through large wire rings supported by stakes set on opposite sides of the plant.

Care in Use of Sprays

ALL spray materials referred to in this article should be used at the rates recommended by the manufacturers. Two applications at an interval of 10 days are more effective than one heavy application.

Especially where organophosphorus materials have been recommended, full precautions should be taken, particularly when the concentrated form is being handled.

If more information than that supplied on containers is required, growers should seek advice from officers of the Horticulture Division of the Department of Agriculture.

All therapeutants should be carefully stored to prevent handling by unauthorised people, especially children. Empty containers should be burnt or buried.

During summer the plants will need watering, manuring, and protection from pests and diseases as recommended in the section on glasshouse culture. As leaf-roller caterpillars can cause much damage among plants outdoors, plants should be sprayed in addition with DDD.

Just before flowering, plants should be given a side dressing of 1 part by weight sulphate of potash and 4 parts by weight sulphate of iron at 1 oz to the square yard of the mixture.

Though higher prices are obtained for disbudded blooms, some growers find that it does not pay to disbud the dwarfer types, and the flowers are therefore sold with the side buds still attached to the centre flower.

Marketing

Flowers should be gathered when the petals are fully expanded and flat. They should be picked with long stems and the stems placed in deep buckets of water for four to six hours before packing.

Carnations are usually bunched in sixes or twelves with the heads at one level, and buyers normally prefer bunches of one colour. Flowers may also be packed singly, with 36 in a long, flat box. When flowers are packed in deep boxes each layer should be separated from the one above by a sheet of florist's tissue (not newspaper) and the top layer held firmly with a cleat of wood across the box.

Diseases and Pests

Diseases of carnations are more difficult to control than pests which affect them. Most pests can be controlled by using the correct insecticide, but some diseases are systemic (carried in all parts of the plants) and may also be soil borne, and special measures must be taken to ensure the maintenance of healthy stocks and disease free soil.

Systemic Diseases

Carnations are susceptible to two main types of systemic diseases: Wilt diseases caused by the fungi *Fusarium* and *Verticillium*, and virus diseases caused by carnation mosaic virus and possibly others.

Wilt Diseases

Fusarium and *Verticillium* fungi both produce gradual wilting of the plant, whole branches wilting and, in the later stages, the leaves becoming straw coloured; the vascular tissues are stained.

Infected plants and the soil should be removed and burnt. There is no satisfactory soil sterilant for applying to the soil from which affected plants are removed, but the spread of the diseases from infected areas (after removal of the plants) can be checked by drenching the soil with a copper oxychloride solution. Apply 2 gallons per square yard of a solution made by adding 2 lb of copper oxychloride to 10 gallons of water. The area should not be replanted. After all the plants have been removed at the end of cropping the soil should be sterilised as recommended earlier.

Propagating material should be taken from visibly healthy plants. Even this will not ensure complete freedom from these diseases. Carnation nurserymen overseas have adopted a special technique called culturing. Parent plants, known as "mother plants", are tested in laboratories for freedom from these wilt diseases. Cuttings are taken from "clean" plants only; plants showing any disease are discarded. Plants raised in this way are known as cultured cuttings and carnation growers importing plants are recommended to specify such cuttings.

Cuttings from these sources should be grown subsequently in sterilised soil or at least soil in which carnations have not been grown.

Virus Diseases

Carnations are susceptible to virus diseases, especially mosaic, which causes yellow blotches on the leaves and streaking of the flowers. This disease is transmitted by aphids as well as from infected propagating material. Many stocks of carnations in New Zealand are infected with this virus and possibly with others not yet fully identified.

A technique developed overseas recently involves special treatment of the parent plant to obtain new virus-free strains. In a few years it may be possible to purchase plants which are free of both virus and vascular wilts. Already it has been shown that virus-free plants give more flowers.

Other Wilt Diseases

Three other soil-borne diseases can cause wilting of carnations: *Sclerotinia, Rhizoctonia* spp., and *Fusarium culmorum*. They produce rotting at the base of the plant, which blocks the vascular tissues and causes wilting. *Rhizoctonia* produces a damp rot and *Sclerotinia* a drier rot frequently covered with a web of fungus.

Fusarium culmorum produces a pinkish colour in the plant tissue; this disease occurs under cold, damp conditions. It can be controlled by proper cultural attention and spraying with zineb. Where *Rhizoctonia* or *Sclerotinia* occurs infected plants should be removed. The area may be replanted after the soil has been drenched with the copper oxychloride solution already mentioned or "Phygon XL" (2 lb to 100 gallons applied at 2 gallons per square yard).

Leaf Diseases

Probably the most destructive leaf disease is leaf rot caused by *Heteropatella vitellinensis*. This causes severe damage to outdoor crops, especially in wet weather. Typical symptoms are large discoloured brown areas on the leaves and stems. Infected parts should be removed and burnt and the remaining plants sprayed regularly with thiram or zineb.

Ring spot, caused by *Heterosporium echinulatum* (*Didymellina dianthii*) produces small round spots on the leaves, stems, and calyces; a grey to brown fungus grows on the spots. Hygiene and fungicidal sprays will reduce damage.

Blight is caused by *Alternaria dianthii*, producing round raised spots with a sooty black mould on the leaves and sometimes on the calyces. This disease is similar to *Septoria* spot (*Septoria dianthii*), except that the round spots have black specks over the surface. Both can be controlled by hygiene and fungicidal sprays.

Rust caused by *Uromyces dianthii* can be very damaging, producing orange pustules on the leaves. Varieties differ in their resistance, but spraying with zineb at three weekly intervals will prevent this disease from developing.

Diseases on Flowers

In cool, damp weather both outdoors and in unheated glasshouses botrytis can damage opening buds and completely spoil the flowers, finally producing a grey mould on the whole flower. This damage can be reduced by removing all damaged flowers and spraying with thiram. All rubbish from disbudding, etc., should be regularly collected and removed from the area.

The disease anther smut (*Ustilago violacea*) has been occasionally identified, mainly in the variety Frank Aldritt (Otaki Pink). It produces a sooty purple mass of spores in the flowers and the plants are usually stunted and rather bushy. As the disease can be carried systemically and cannot be controlled and can be spread from infected flowers by

Varieties of Carnations

OWING to the earlier predominance of pink carnations of the dwarf varieties, florists used to show a preference for this colour in the markets. However, since the introduction of the better quality tall varieties, most clear coloured varieties sell equally well. There is still only a limited demand for striped or unusual coloured varieties.

PINK

Frank Aldritt (Otaki Pink): Dwarf. Popular pink variety, flowering throughout the year, with the main period in December and January. Most stocks are infected with mosaic virus.

Rose Clove: Dwarf. Scented, suitable for winter flowering. Susceptible to rust disease.

Monty's Pink: English variety suited for outdoor culture in the Auckland area.

Ashington Pink: English tall variety, more spreading than the American type. Still popular for glasshouse culture in the Christchurch area.

Laddie Sim
Shocking Pink Sim
Salmon Sim
} Tall American varieties with slight differences in shade of colour.

SCARLET

Phyllis: Medium height, suitable for outdoor culture.

Grenadier: Old variety of medium height flowering mainly in summer. Suitable for outdoor culture.

William Sim
Red Sim
Scania Sim
} Tall American varieties with slight differences in shade of colour.

CRIMSON

Crimson Clove: A crimson form of Rose Clove.

Joker: A tall variety. An improvement on the older varieties such as Joyce.

WHITE

White Clove: A white form of Rose Clove.

Hannah Jarvis: A New Zealand-raised variety. Tall, suitable for outdoor culture in the warmer areas only.

White Sim Improved.

Northland: Tall English type.

YELLOW

Harvest Moon
Midas
Gulda Regn
} Tall American types.

OTHER COLOURS

Tangerine Sim: Orange yellow. Tall.

Purple of Heemstede: Purple, scented. Tall.

Peppermint Sim: Light pink and red variegated. Tall.

handling and watering, all infected plants should be removed and burnt.

Grassiness

Occasionally some plants produce a mass of shoots but few flowers. This is called "grassiness" and appears to be a genetical condition. Though they may appear promising as a source of cuttings, affected plants should not be selected for propagating.

Soil Pests

Soil-inhabiting insects that can damage carnations are likely to be present in land previously under grass. Wireworms, grass grubs, and springtails (from partially rotted organic matter) can all be controlled by applying aldrin or dieldrin before planting. These materials are often incorporated in specially prepared superphosphate, which could be used in the base manure. Slugs and snails can be numerous in damp weather, especially if there are rough grass and weeds near the growing area. Metaldehyde baits available in various forms will control slugs and snails.

Foliage Pests

The foliage and young flower buds can be seriously damaged by sap-sucking insects such as red spider mites and aphis or chewing insects such as leaf-roller caterpillar.

Red spider mites are particularly troublesome in glasshouses when the atmosphere is hot and dry, especially in summer. The mites can be seen as minute yellow, grey, or red dots on the leaves and the plants develop a greyish, dry appearance.

They can be controlled by spraying regularly at three weekly intervals, whether the mites are seen or not, with organo-phosphorus sprays such as malathion (for the home gardener) or schradan, methyl demeton, or parathion for commercial producers. Flowers should be cut before these materials are applied. Kelthane is another material suitable for commercial growers.

In well built glasshouses azobenzene smokes are effective, but the temperature must be above 70 degrees F. and the treatment repeated after 10 days.

Aphids

Aphids cause damage both by sucking the sap and by transmitting virus disease. Those affecting carnations are green and cluster round the tips of the leaves and the young flower buds. These become distorted and also covered with a sticky secretion from the aphids. The organo-phosphorus sprays used against red spider mites will control aphids. In glasshouses lindane smokes can be used.

Caterpillars

Leaf-roller caterpillars can cause serious damage, especially to outdoor crops, before they are recognised. They tie the tips of the leaves together and chew young flowering shoots. The organo-phosphorus sprays used for mites or aphids will control these caterpillars, but additional residual effects can be obtained by using DDD as well.

Flower Pests

In addition to earlier damage to flowers caused by sucking insects petals can be seriously damaged by thrips. Typical symptoms are white streaks on coloured petals. Frequently the quick-moving black thrips can be seen within the flowers. The routine insecticide sprays will control them, or lindane or DDT, which will also control earwigs which chew petals, can be applied.

Work for February

Water plants as necessary, giving a heavy soaking and then mulching if possible. Shrubs and trees which were planted last winter should have preference if water is short. Washing-up water can be used at a pinch.

By JOY WATKINS,
Horticultural Advisory Officer,
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Auckland

A light watering will encourage surface rooting, making the roots more easily damaged by droughts later.

Do not apply fertiliser to dry soil, as it can scorch roots with which it comes in contact. Water first, then apply fertiliser and water it in.

Dahlias and chrysanthemums should receive side-dressings of balanced fertiliser mixtures.

Cut off dead flower heads, using a sharp knife or secateurs for shrubs and cutting back to a healthy leaf or bud. By preventing seed formation flowering is frequently prolonged, as more flower buds develop.

Watch for suckers on any grafted plants (roses and named varieties of many trees and shrubs); also green branches on variegated trees. When these are small and soft they can easily be rubbed out. Larger suckers which have become woody should not be cut back, as this would encourage growth of dormant buds at the base of the sucker; the sucker should be wrenched out at the base with a twisting movement, when no buds will remain.

Suckers from the roots of plants such as lilac can be very troublesome unless dealt with in this way. The soil must first be dug out carefully to expose the root. Care should always be taken when cultivating near shrubs, as many of them produce suckers if roots are damaged. For this reason, if for no other, avoid digging or hoeing deeply near shrubs.

Weed control is essential to prevent seeding of the weeds and to reduce competition for water and plant food.

Pests

Pests multiply rapidly at this time of year. If only a few aphids are seen at the tips of one or two shoots, it may be simpler to dip these tips in a small bowl of diluted spray material rather than to spray the whole shrub. The commonest pests and their control (in 4 gallons of water) are:

Aphids: 1 oz of lindane wettable powder or 1 oz of malathion.

Thrips: 1 oz of 20 per cent DDT emulsion.

Red spider mite: 1 oz of malathion.

Leaf roller: 1 oz of malathion or ¾ oz of DDD.

Scale: ½ pint of summer oil.

Sow

Winter-flowering annuals: Stocks, cinerarias, pansies, antirrhinums, nemesias, Iceland poppies, calendulas, and the earliest sowing of winter-flowering sweet peas. Good drainage, deep cultivation, heavy manuring, and liming are all important for good results with sweet peas.

Biennials and perennials: aquilegias, Canterbury bells, primroses and polyanthus, anemones, ranunculus, and cyclamen.

Plant out

Seedlings of iceland poppy from the first sowing made soon after Christmas.

Plant

Winter and early spring flowering bulbs: Daffodils and narcissi, grape hyacinths, lachenalias, freesias, ixias, sparaxis, and ornithogalum. (Good drainage and a deeply worked soil are essential, particularly for ranunculus. Lime is necessary for tulips and anemones.)

Bulbs show little response in the first year to manuring, but potash and phosphate should be applied before planting (1 oz of sulphate of potash and 3 oz of bone meal to the square yard).

GARDEN WORK . . .

Green vegetable bug: 1 oz of malathion or 1 oz of lindane 25 per cent wettable powder.

Diseases

Diseases must be prevented by regular applications of sprays (in 4 gallons of water) or dusts.

Powdery mildew: 1¼ oz of karathane or 3½ fl. oz. of lime sulphur plus ½ oz of colloidal sulphur.

Rust: 1½ oz of zineb or 3½ fl. oz. of lime sulphur plus ½ oz of colloidal sulphur.

Leaf spots: 1½ oz of zineb.

Propagation

Shrub cuttings can be taken from soft tips about 3 in. long or from semi-ripe shoots about 6 in. long which are firm and woody at the base though still soft at the tip. These cuttings need a close damp atmosphere for rooting, in a frame or should be covered with a plastic bag if in a pot. Most shrubs root from semi-ripe cuttings.

Layer carnations.

Bud roses. If no rootstock is available (grown from a hardwood cutting of *R. multiflora* inserted at the end of March), healthy branches of Cecile Brunner can be used. Insert buds of the desired variety about 8 in. apart in the Cecile Brunner stem. In late March cut the stem into lengths 6 to 8 in. long, each with a bud at the tip, and place in the open ground to root in the usual way.

Roses

Roses which were summer pruned and kept dry since early January will have firm wood and plump buds. Encourage growth early in February by heavy watering and applying a balanced fertiliser mixture at 4 oz a square yard. Flowering will recommence in early autumn.

Glasshouse and House Plants

Apply further shading to glasshouses, if necessary, to avoid scorching. Keep house plants out of direct sunlight during the middle of the day. Water and damp down liberally. Apply liquid fertiliser regularly to pot-bound plants.

Propagate by leaf or stem cuttings such plants as peperomia, Rex begonia, aluminium plant, and other house plants.

In cold districts sow or pot up primula, cineraria, stock, and bulbs for winter flowering in pots. Place pots of bulbs in a cool, dark place to develop good root systems.

Sow cyclamen in pots or boxes, spacing the seeds out and covering with ⅛ in. of finely sieved compost and then with ½ in. of damp peat, which is removed as soon as the seedlings push through the compost. A temperature of 60 to 65 degrees F ensures comparatively rapid germination. Experiments in Germany indicate that germination is better in neutral (pH 7) than in acid (pH 4 to 6) soil mixtures.

Floral Decoration

Cut flowers for drying, stripping off all leaves before tying in small bunches to dry in a dark, airy shed. Cut mature leaves of silver and other ferns for pressing and drying between newspapers.

Cut branches of beech, etc., and place cut ends in a jar of 2 parts of water to 1 part of glycerine for 10 to 14 days to preserve them.

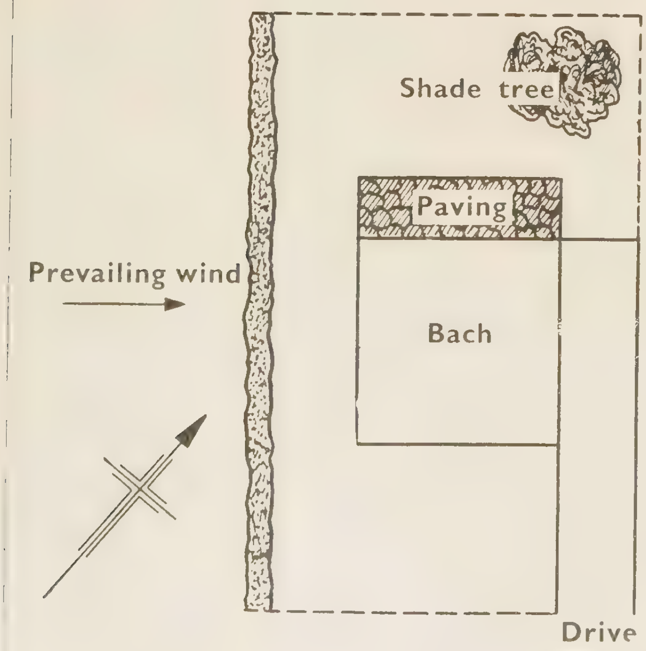
Pick hibiscus flowers in the afternoon. They will last two or three days without water. Flower stalks can be placed in dry reed or grass stalks to add to the length of the stem.

Use red, orange, and yellow flowers for gay party arrangements. Use blue, white, green, and pastel shades for cool, restful effects.

When arranging a mixture of flowers, group each kind and as far as possible place them in the same relative position as they would be found in the garden, the tallest giving height to the arrangement and the dwarf ones clustering at the base, probably at the focal point.

Long-lasting foliage and flowers are echeveria and other succulents, sansevieria, statice, erigeron, lavender, flax, senecio, *Felicia amellioides* (*Agathaea coelestis*), marguerites, scabious, and lamb's ear.

Bach Gardening



The holiday bach may prove to be less of a relaxation than is desired unless thought is given to the layout of the section. A simple plan will need the minimum of upkeep.

A clump of mint in a bottomless can or bucket sunk to the rim in the ground and a small patch of parsley are a boon to the cook and need be the only cultivated part of the section.

Do not plant shrubs close to the house walls, as they restrict air movement and harbour mosquitoes.

In the open space round the bach privacy is not so desirable as it may be in the home garden, but a screen on the windward side is invaluable. A windbreak of well chosen shrubs (those which thrive in the local soil and climate) is a cheap, and possibly the most attractive, solution. It should not be clipped.

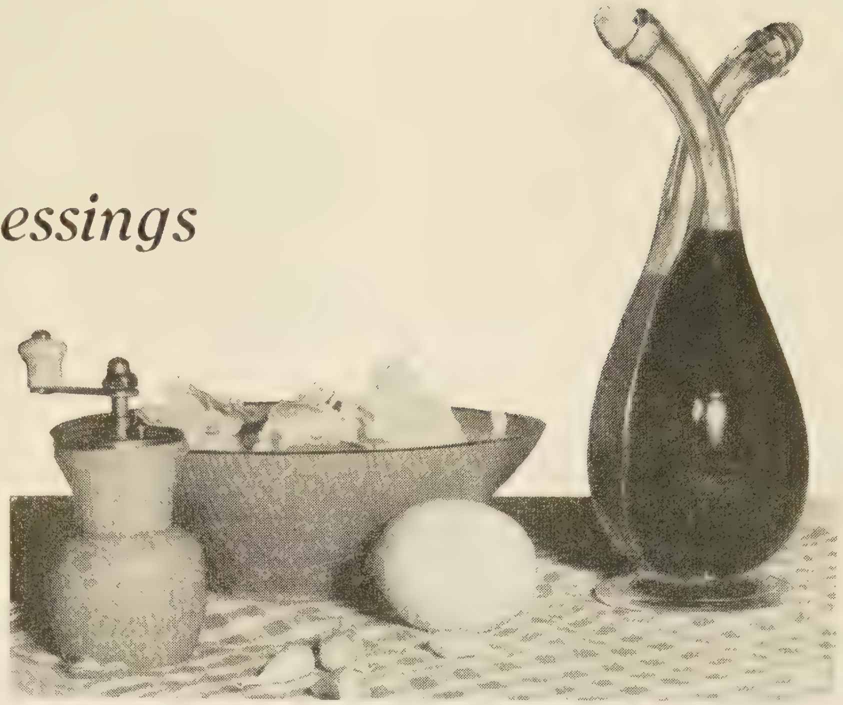
Suggestions for a seaside windbreak are tamarix, oleander, hebe, escallonia, feijoa, fuchsia, pittosporum, and pohutukawa. Inland, phebalium, rhododendron, *Cotoneaster simonsii*, choisya, olearia, and lilac are a few of the many informal hedge plants. Buddleia is excellent if it is cut hard back in early spring each year. The rest will benefit from an occasional shaping.

One tree suitably placed will provide welcome shade.

Upkeep of the section will thus be reduced to mowing, and even this can be limited if part of the area is paved or sanded.

Though ground-cover plants such as mesembryanthemum, gazania, or prostrate shrubs have their uses in situations where mowing is impossible, such planting needs hand weeding, particularly during the first season. The same is true of "weed" lawns such as Mercury Bay weed.

Simple Salad Dressings



SALADS can be made or marred by their dressings. A green salad made from torn lettuce leaves, chopped chives, a little mint and parsley, diced or curled celery stalks, and small sprigs of celery leaves needs only a light French dressing to complete it. The bowl may be rubbed with a cut clove of garlic before the salad is tossed lightly in the dressing. The salad, which should be crisp and cold, should be served immediately.

All quantities in these recipes are level and in standard measures.

French Dressing

¼ teaspoon of salt
A dash of freshly ground black pepper
2 oz of vinegar
4 oz of salad oil (olive oil)

Put the seasonings in a bowl, add the vinegar, and mix well. Correctly, the oil should be beaten in with a fork, but all the ingredients may be shaken in a mixer until the dressing thickens. The oil separates out on standing and the dressing needs to be re-beaten before use.

Various flavours can be added to this basic dressing depending on the type of salad it is to accompany. Chopped chives are used with vegetable salads and 2 teaspoonfuls of capers may be added for a cold, white fish salad. Tarragon vinegar may be substituted for malt vinegar or chopped fresh tarragon leaves added. This should be used with hard boiled eggs or egg salad.

Cooked Salad Dressing

Cooked salad dressing is a useful stand-by for busy times, as it can be made in concentrated form and will keep in a refrigerator for three or four days. Only a few minutes are needed to measure out the amount required for a meal and to break it down with cold milk.

1½ tablespoons of flour (or 1 household dessertspoon)
1½ tablespoons of sugar
1 teaspoon of mustard
1 teaspoon of salt
¼ teaspoon of cayenne pepper
1 egg
6 oz of milk*
1 oz of butter, melted
2 oz of vinegar

* Reduce the quantity of milk to 4 oz if concentrated dressing is required.

Mix the dry ingredients together in the top of a double boiler. Beat the egg slightly and mix it with the milk. Carefully blend this liquid with the dry ingredients. Place the saucepan over hot water, add the melted butter, and heat the dressing for a few minutes, stirring with a wooden spoon to prevent lumps. The dressing is cooked when it begins to coat the spoon. Let it cool and stir in the vinegar gradually.

Mayonnaise

1 egg yolk
1 teaspoon of salt
A small pinch of cayenne pepper
2 tablespoons of lemon juice or vinegar
½ teaspoon of mustard
¼ teaspoon of paprika
8 oz of salad oil

Put the egg yolk and seasonings into a small bowl and beat them well. Add 1 tablespoon of lemon juice or vinegar and continue beating. Pour in the oil ½ teaspoon at a time, beating thoroughly each time. When 2 oz of oil has been used add it in larger amounts, continuing beating. As the mixture thickens, stir in the rest of the lemon juice or vinegar. If the oil is added too rapidly, the mayonnaise will curdle. If this happens, immediately beat a second egg yolk into the mixture a little at a time. This dressing should be thick and creamy.

Whipped Cream Dressing

1 cup of fresh cream (8 oz)
1 teaspoon of salt
1 teaspoon of mixed mustard (bottled oil-mixed mustard may be used)
A dash of freshly ground black pepper
2 oz of vinegar
A pinch of cayenne pepper

Whip the cream and fold in the other ingredients. This dressing is very quickly made and when mixed with a tablespoon of marmalade is excellent with fruit-lettuce salads, for example, lettuce leaves with sliced pineapple and cream cheese, or a peach half stuffed with a ball of cheese and chopped walnuts and placed on a bed of shredded lettuce.

Variations for Cooked Salad Dressing or for Whipped Cream Dressing

Chive Dressing

Combine 1 cup of dressing with 2 tablespoons of chopped chives (cut with kitchen scissors). Serve with egg salad.

Savoury Dressing

Mix 1 cup of dressing which has been made with tarragon vinegar instead of malt vinegar with ⅛ teaspoon of dried mustard and ⅛ teaspoon of Worcestershire sauce. Serve with cold beef and green salad.

Anchovy Dressing

Mix 1 cup of salad dressing with 2 teaspoons of concentrated anchovy essence and 2 teaspoons of chopped parsley. Serve with cold fish salad.

Mint and Egg Yolk Dressing

Hard boil an egg and put the yolk through a fine sieve. (The white may be used in the salad.) Combine 2 tablespoons of chopped mint with the egg yolk and fold it into 1 cup of dressing. Serve with cold mutton or orange and lettuce salad.

—BETTY M. JOHNSTON,
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Coffee Hot, Coffee Cold, and Coffee Cooking

COFFEE not only makes a popular refreshing drink, but is also a delightful flavour to use in cooking. Coffee-flavoured cakes, puddings, and biscuits provide a welcome change for the inventive cook, who will find the coffee syrup (recipe on page 104) a useful flavouring with a variety of uses.

WHETHER you make your coffee in an open pan or use an elaborate coffee maker, you will bring out the full flavour of the coffee if you follow these simple rules:

Keep the coffee maker perfectly clean or use a special pan for coffee only and never wash the equipment with soap or soda.

Use freshly ground pure coffee. If it is impossible to buy coffee regularly in small quantities, a coffee grinder is a wise investment. The coffee beans keep in good condition for some time, but ground coffee tends to lose its flavour after a few days.

Store the beans or ground coffee in an airtight container.

Experiment to find the strength you like and use the same brewing time and the same amount of coffee each time. One level tablespoon of coffee to 1 cup of water for black coffee and 1 level tablespoon to $\frac{1}{2}$ cup of water and $\frac{1}{2}$ cup of milk for white are average measurements.

Use the full capacity of your coffee maker for the best results.

Never boil coffee. When coffee is boiled an undesirable flavour change takes place and the brew is inclined to be bitter.

Serve coffee immediately it is brewed if possible. Freshly made coffee has a full, fresh flavour, but if it is necessary to let it stand, keep the

← A coffee sponge roll filled with cream subtly flavoured with coffee syrup and accompanied by coffee served in attractive china makes a delectable afternoon or supper treat. (See recipe on page 102.)

coffee at serving temperature by placing it over a pan of hot water. Coffee can never be reheated without a loss of flavour.

There are several ways of making good coffee and a great variety of coffee makers available, so the methods used are a matter of choice. The blend of coffee and the shade of roast used also depend on personal preference, but it is well to remember that a medium roast has more aroma and keeps fresh longer than an overdark one.

To ensure the best results the degree of fineness of grinding should be suited to the type of apparatus used. As a general rule medium-ground coffee is used for percolators and for the open pot method, while vacuum, drip, filter, pressure, and espresso makers require finely ground coffee. However, there are exceptions to this. For instance, a glass maker of the pressure vacuum type requires medium coarse-ground coffee and it is usual for the instructions supplied with different types of coffee makers to state the grind best suited to the equipment.

Coffee Variations

Coffee can be served in a variety of interesting ways apart from the usual black or white, white usually being half coffee and half hot milk, or black with cream, and these variations are well worth trying:

Cafe Cappucino

Combine hot coffee and hot milk. Top with whipped cream and sprinkle with cinnamon, nutmeg, grated chocolate, or chocolate powder.

Italian Coffee

Serve hot strong coffee in small cups, add a piece of lemon peel, and sugar to taste.

Viennese Coffee

Serve strong black coffee and top with a swirl of vanilla-flavoured whipped cream.

By NAOMI F. BANKS,
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Auckland

Coffee Royale

Add brandy to sweetened black coffee or pour brandy on to a lump of sugar in a spoon, set it alight, and stir it into the coffee.

Orange Coffee

Add a coffeespoonful of orange curacao to each cup of strong black coffee.

Mocha Chocolate

1 oz of chocolate
1 pint of milk
1 tablespoon of sugar
½ pint of strong hot black coffee
Vanilla to taste

Melt the chocolate and add the milk, sugar, and vanilla to taste. Bring to the boil, but do not boil. Pour in the hot coffee and whisk the mixture. Serve steaming hot topped with whipped cream and chocolate shavings.

Iced Coffee

Ice-cold coffee in its many variations makes a refreshing summer drink.

Iced coffee black: Half fill tall glasses with ice cubes and pour double strength hot black coffee over them. Sweeten to taste.

Iced coffee white: Sweeten normal strength hot black coffee with sugar to taste. Chill the mixture in a tightly covered container for two to three hours. Chill the milk separately and mix with the coffee just before serving, using ⅔ coffee to ⅓ milk.

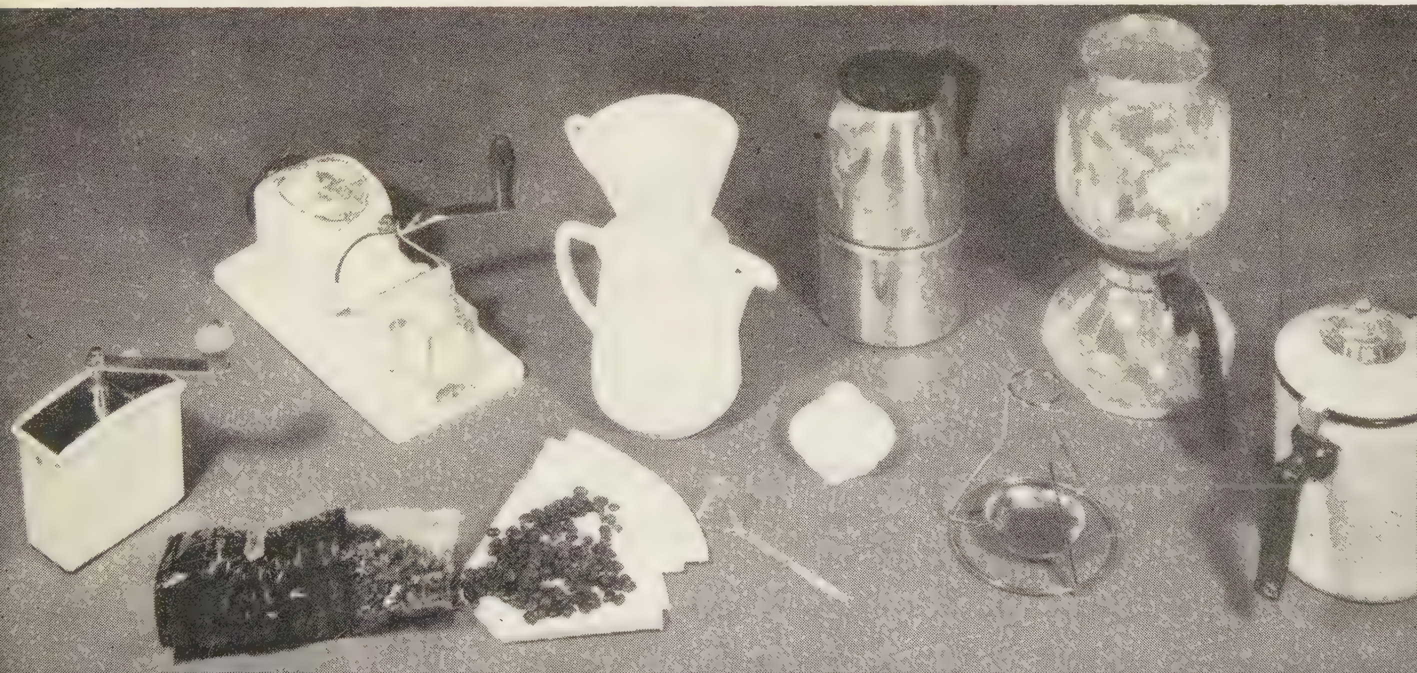
To give iced coffee an attractive frothy top mix the coffee and milk in a shaker or whisk with an egg beater and serve in long glasses with straws. For flavour changes top iced coffee with a swirl of rum- or vanilla-flavoured whipped cream, or sprinkle unflavoured whipped cream with cinnamon or chocolate powder.

A generous spoonful of ice-cream, either vanilla or coffee flavour, stirred into iced coffee makes a very pleasant drink.

Coffee Nog

1 pint of strong black coffee (chilled)
½ pint of milk (chilled)
1 egg
2 dessertspoons of sugar

Beat the egg yolk and sugar together until thick and creamy, then add the



↓ Good coffee can be made in various ways. Here is a selection of grinders and coffee makers showing the basic types. Left to right, a table grinder, a wall grinder, an earthenware drip pot with filters and a measuring spoon, a metal pressure espresso maker, a glass pressure vacuum type with its stand, and a percolater.

Mocha chiffon pie is a luscious party sweet which tastes even better than it looks.

coffee and milk slowly, stirring constantly. Whip the egg white stiffly and fold the liquid into it. Pour into long glasses, chill thoroughly, and serve with a straw.

Coffee Puddings

Fluffy Coffee Whip

1 tablespoon of gelatine
½ cup of milk
1½ cups of hot black coffee
1 teaspoon of rum essence
6 oz of sugar
¼ teaspoon of salt
3 eggs

Soften the gelatine in the milk and let it stand for five minutes. Add 3 oz of sugar, the salt, and the softened gelatine to the hot coffee and stir until the gelatine dissolves.

Beat the egg yolks with the remaining sugar, add to the gelatine mixture, and cook over hot water for five minutes, stirring all the time. Chill until the mixture is slightly thick.

Beat the egg whites stiffly and fold the slightly thickened gelatine mixture and the rum essence into this.

Pour into individual glass dishes and serve with cream, and chopped cherries.

Mocha Chiffon Pie

1 tablespoon of gelatine
¼ cup of cold water
½ cup of strong black coffee
2½ oz of dark chocolate
3 egg yolks
6 oz of sugar
½ teaspoon of salt
½ teaspoon of vanilla
1 tablespoon of grated orange rind
3 egg whites
Whipped cream
Nuts
1 baked 8 in. pie shell

Soften the gelatine in the water and let it stand for five minutes. Heat the coffee and chocolate together and beat until the chocolate is dissolved and the mixture smooth. Stir in the gelatine until it dissolves.

Add 4 oz of sugar with the salt, vanilla, and orange rind to the egg yolks and beat. Stir in the coffee-chocolate-gelatine mixture. Chill until slightly thickened.

Beat the egg whites stiffly, then beat in the remaining 2 oz of sugar, making a stiff mixture. Fold the gelatine mixture into this and pour into the pie shell.

Chill until set and decorate with whipped cream and nuts if desired.

Coffee Rice Cream

2 oz of flaked rice
1 to 2 oz of sugar
1 egg
½ pint of milk
½ pint of strong black coffee
Vanilla

Put the milk, coffee, and sugar in the top of a double boiler and bring to the boil. Sprinkle in the flaked rice and cook over hot water for 45 to 60 minutes or until thickened. Beat the egg, stir it into the mixture, and cook two minutes longer.

Cool the mixture and when almost cold beat with a rotary beater until light and creamy.

Serve with raw or stewed fruit.

Surprise Fudge Pudding

4 oz of flour
2 teaspoons of baking powder
8 oz of sugar
5 tablespoons of cocoa
¼ teaspoon of salt
2 oz of butter
½ cup of milk
1 teaspoon of vanilla
1 cup of hot, strong black coffee

Sift the flour, baking powder, 4 oz of sugar, 3 tablespoons of cocoa, and salt into a bowl. Heat the butter and milk until the butter has melted and add to the dry ingredients with the vanilla.

Beat the mixture well and pour into a greased ovenproof dish. Combine the rest of the sugar and cocoa and sprinkle over the top of the batter. Pour the hot coffee over the top and bake at 350 degrees F for 35 to 45 minutes or until done.

During the baking the cake mixture rises to the top and a delicious mocha sauce forms underneath.

Serve with whipped cream flavoured with coffee syrup.

Mocha Souffle

2 tablespoons of flour
2 tablespoons of butter
¾ cup of scalded milk
3 tablespoons of hot, strong black coffee
1½ oz of chocolate
1 teaspoon of vanilla
3 eggs
⅓ cup of sugar

Melt the butter, stir in the flour, add the milk, and stir over heat until the sauce is thick and creamy. Melt the chocolate over boiling water, add the sugar, hot coffee, and vanilla, and beat into the sauce. Add the egg yolks and mix well. Set aside to cool.

Beat the egg whites until stiff, then fold in the sauce gently but thoroughly.

Bake in a deep dish at 350 degrees F for 30 to 45 minutes.

Coffolate Mousse

4 oz of dark chocolate
2 egg yolks
2 tablespoons of strong black coffee
2 egg whites

Melt the chocolate in the coffee over a very low heat. Mix in the egg yolks and cook for one minute over a low heat. Beat the egg whites stiffly and fold them into the mixture. Pile into small individual dishes and leave in a cool place for several hours to set.

The mousse which is very rich can then be decorated with whipped cream and chopped nuts.

Coffee Cakes

Coffee Sponge Roll

3 eggs
4 oz of sugar
4 oz of flour
½ teaspoon of cream of tartar
¼ teaspoon of baking soda
3 tablespoons of hot, strong black coffee

Beat the eggs and sugar together until thick and creamy. Sift the flour, baking soda, and cream of tartar together and fold gently into the beaten eggs and sugar. Carefully stir in the coffee, being careful not to overmix.

Pour into a greased Swiss roll tin. Bake at 400 to 450 degrees F for 10 minutes or until done.

Place a sheet of waxed paper on a cloth which has been wrung out in hot water. Sprinkle the paper with icing sugar and turn the hot sponge out on to the paper. Spread the sponge with warm jam or if it is to be filled with cream, put a sheet of waxed paper on top of the sponge so that it does not stick together.

Roll the sponge up and let it cool, then unroll and fill with coffee-flavoured whipped cream.

Topper Coffee Cake

Cake

2 oz of butter
4 oz of sugar
1 egg
4 oz of flour
2 teaspoons of baking powder
¼ cup of strong black coffee
½ teaspoon of vanilla

Cream the butter and sugar, add the egg yolk, and beat well. Sift the dry ingredients and fold them into the mixture alternately with the coffee. Beat the egg white stiffly and fold it in with the vanilla.

Filling

4 oz of brown sugar
1 cup of chopped walnuts
2 tablespoons of melted butter
2 teaspoons of cinnamon
2 tablespoons of flour

Mix all together thoroughly.

Spread half of the cake mixture in a deep 7 in. tin and sprinkle with half of the filling. Add the remaining cake batter and top with the rest of the filling.

Bake in a moderate oven 350 to 400 degrees F for 45 minutes.

Coffee Gingerbread

4 oz of butter
2 tablespoons of sugar
10 oz of flour
1 teaspoon of ground ginger
1 egg
1 teacup of treacle
1 teacup of milk
2 tablespoons of strong black coffee
1 teaspoon of baking soda

Cream the butter and sugar. Mix in 1 dessertspoon of flour, then the egg and treacle. Beat well. Sift the rest of the flour and ground ginger and fold in alternately with ¾ cup of mixed milk and coffee. Dissolve the soda in the remaining ¼ cup of milk and stir into the mixture.

Pour into a 9 in. tin and bake at 350 to 400 degrees F for 45 minutes or until firm.

Variations

Serve as a cake iced with coffee icing or cut, buttered, and spread with lemon cheese. Or cut into squares and serve warm as a dessert with apple sauce, cream, or ice cream.

Coffee Raisin Cake

4 oz of butter
8 oz of brown sugar
3 eggs
10 oz of flour
¼ teaspoon of salt
2 teaspoons of baking powder
⅓ cup of strong black coffee
¼ cup of cream
1 cup of raisins
½ cup of chopped peel

Cream the butter and sugar. Add the eggs one at a time, beating each one in thoroughly. Sift the dry ingredients together and fold them into the creamed mixture alternately with the coffee and cream. Stir in the raisins and peel.

Bake in an 8 in. tin at 350 to 400 degrees F for 1 hour or until done.

Coffee Biscuits

Coffee Orange Bars

4 oz of butter
4 oz of brown sugar
⅓ cup of treacle
½ cup of marmalade
¼ cup of cold, strong coffee
10 oz of flour
½ teaspoon of salt
¼ teaspoon of baking soda
½ teaspoon of ginger
½ teaspoon of cinnamon
¼ teaspoon of nutmeg

Cream the butter, sugar, and treacle, then stir in the marmalade, mixing well. Sift the dry ingredients together and add them to the creamed mixture alternately with the coffee.

Spread the mixture into two 13 in. x 9 in. greased pans.

Bake at 400 degrees F for 12 to 15 minutes. Let it cool in the pans for five to 10 minutes then cut into 2 in. x 1 in. bars and let them cool on a wire rack.

Sandwich two bars together with orange or coffee icing and store in a tightly covered container.

Coffee-dipped Moon Biscuits

8 oz of butter
8 oz of sugar
Juice of 1 orange
12 oz of flour
1 teaspoon of baking powder
½ teaspoon of baking soda

Cream the butter and sugar until light and fluffy. Beat in the orange juice. Sift the dry ingredients and stir them into the creamed mixture. Chill for at least 1 hour.

Roll out the chilled mixture ¼ in. thick and cut into crescents or rounds. Bake at 350 degrees F for eight minutes or until lightly coloured. Cool.

Dip the biscuits in a syrup made by boiling 8 oz of sugar, ½ cup of honey, and ¾ cup of strong black coffee for five minutes. Sprinkle the dipped biscuits with chopped nuts.

The biscuits will keep for some time before they are dipped, but should be used soon after dipping as this softens them.

The plain biscuit mixture makes a delicious pie crust.

French Coffee Creams

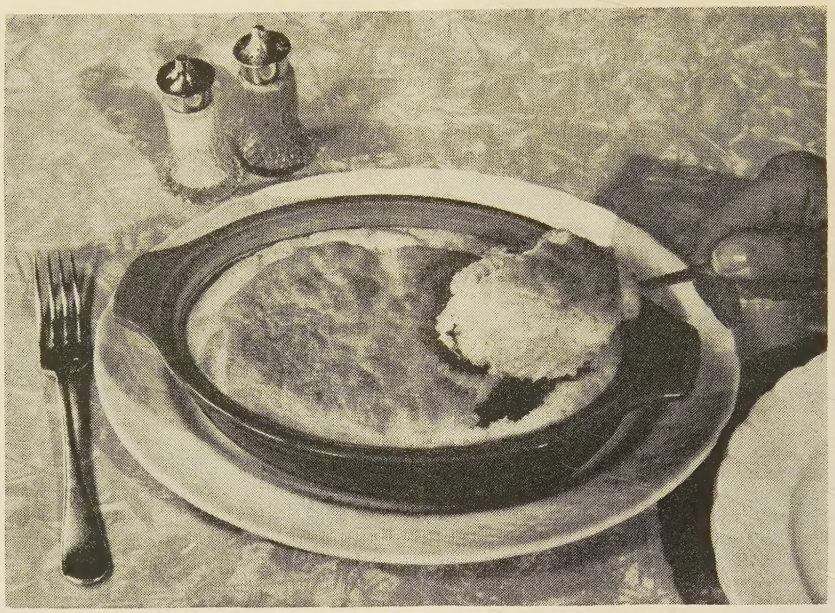
4 oz of butter
4 oz of sugar
1 egg
2 tablespoons of coffee syrup
8 oz of flour
1 teaspoon of baking powder
2 oz of chopped walnuts
1 teaspoon of vanilla

Cream the butter and sugar, add the egg and coffee syrup, and beat thor-

(Continued at foot of page 104)

▼ Dip the cooled coffee moon biscuits in syrup, sprinkle with nuts, and place on a rack to drain.

An Easy Tea



[*Oddies*

THIS recipe provides an inspiration for a quickly and easily prepared meal using a packet soup, but using it with a difference.

Soup Souffle

- 1 packet of soup mix (for example, mushroom, onion, pea with ham)
- 3 eggs, separated
- ½ pint of milk

Make up the soup using the milk instead of the liquid specified on the packet. Bring it to the boil, stirring all the time, and let it cook to the consistency of a thick white sauce.

Remove from the heat, cool slightly, then beat in the egg yolks. Beat the egg whites stiffly with a pinch of salt and carefully fold the sauce mixture into the beaten egg whites.

Turn into an ungreased ovenproof dish, place in a pan of hot water, and bake in the centre of the oven for 25 minutes at 375 degrees F.

Have all the family seated and serve at once, accompanied by grilled tomatoes or bananas with bacon, a crisp tossed salad, or a rich cheese or tomato sauce if the flavour is one suitable for the soup chosen. Three servings.

—JUDITH FERRIER,

Home Science Instructor,
Department of Agriculture,
Christchurch

Coffee Cooking

(Continued from page 103)

oughly. Sift the flour and baking powder, fold into the mixture, then stir in the nuts and vanilla.

Put small spoonfuls of the mixture on to a well greased oven slide and bake in a moderate oven at 350 to 400 degrees F for 15 to 20 minutes.

When the biscuits are cold put two together with coffee icing or coffee filling.

Christmas Cookies

- 10 oz of flour
- ½ teaspoon of salt
- ½ teaspoon of baking soda
- ½ teaspoon of allspice
- ½ teaspoon of cinnamon
- ½ teaspoon of ground cloves
- 2 oz of butter
- 4 oz of brown sugar
- 1 egg
- ½ cup of treacle or honey
- ¾ cup of chopped walnuts
- 1 cup of sliced mixed peel
- ½ cup of cold, strong black coffee

Sift the dry ingredients together. Cream the butter and sugar and beat in the egg and honey. Stir in the peel and nuts, then add the sifted dry ingredients alternately with the coffee.

Put the mixture in a ½ in. thick layer in a well greased shallow dish. Bake at 350 degrees F for 20 to 30 minutes or until firm.

When cool cut into 2 in. squares and store in an airtight tin for at least a week before using.

Miscellaneous

Coffee Syrup

- 4 tablespoons of brown sugar
- Vanilla to taste
- ½ pint of double strength black coffee

Place the sugar in a heavy pan and stir constantly over a low heat until the sugar begins to caramelise. Add the coffee, bring the mixture to boiling point, and simmer gently for two minutes, stirring all the time. Add vanilla to taste, cool, bottle, and store in a cool place.

This syrup can be used instead of essence in baking and is an excellent flavouring for cream, icings, and fillings.

Coffee Icing

- 2 tablespoons of coffee syrup
- 1½ cups of icing sugar
- ½ oz of butter
- Vanilla to taste

Melt the butter in the coffee syrup and beat in the icing sugar and vanilla.

Coffee Butter Filling

- 2 tablespoons of coffee syrup
- ¼ lb of butter
- 1¼ cups of icing sugar

Beat all together until thick and creamy.

Mocha Sauce

- 1 tablespoon of butter
- 1 tablespoon of cocoa
- 1 tablespoon of brown sugar
- Vanilla or rum essence to taste
- 1 tablespoon of cornflour
- 1 tablespoon of golden syrup
- 2 tablespoons of strong, black coffee

Melt the butter, add the sugar, cornflour, and cocoa and stir over heat until the mixture is smooth and thick. Stir in the golden syrup and coffee, using extra coffee if the mixture is too thick, and cook for three minutes. Flavour with vanilla or rum essence.

This sauce is delicious served hot or cold.

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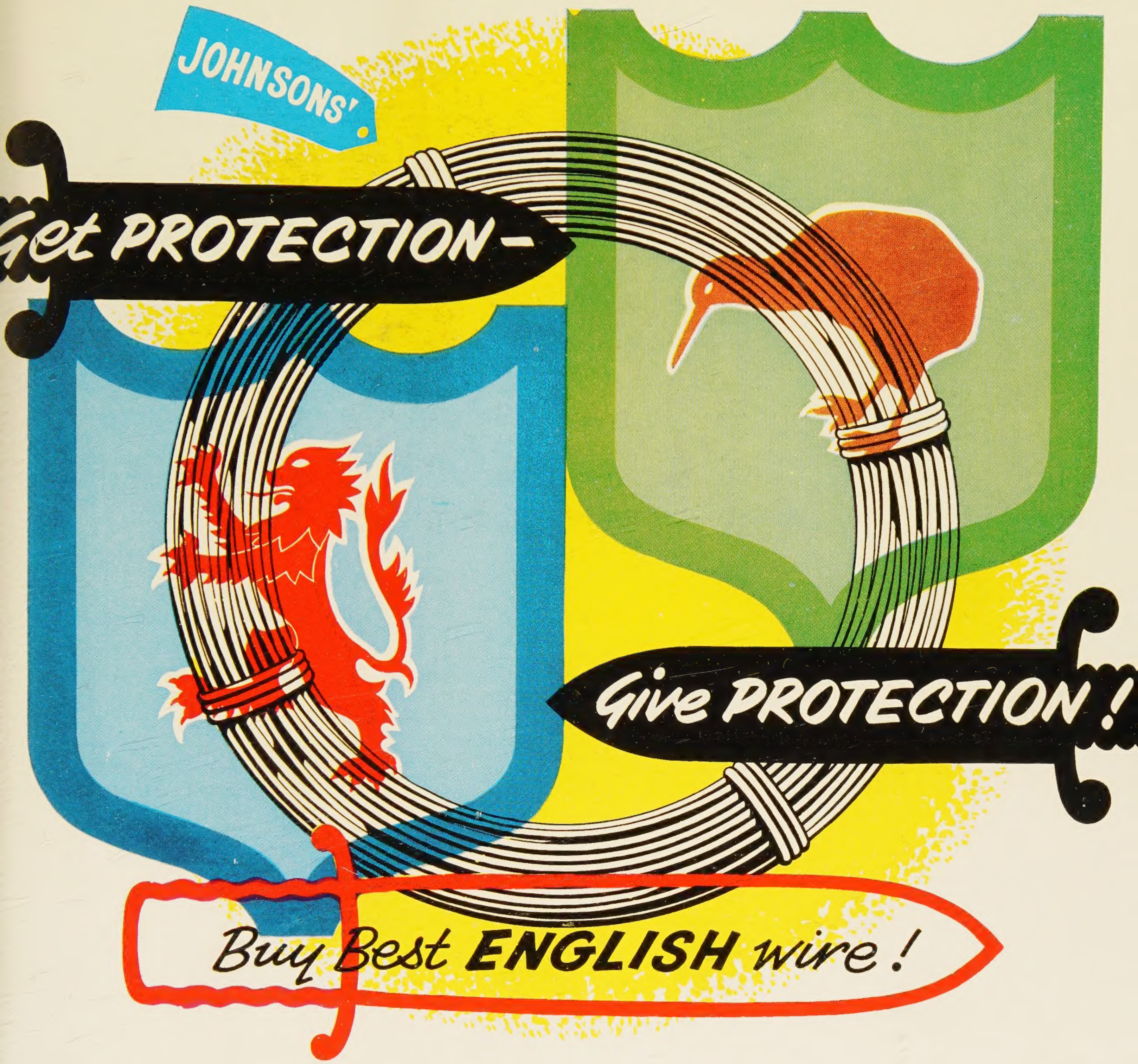
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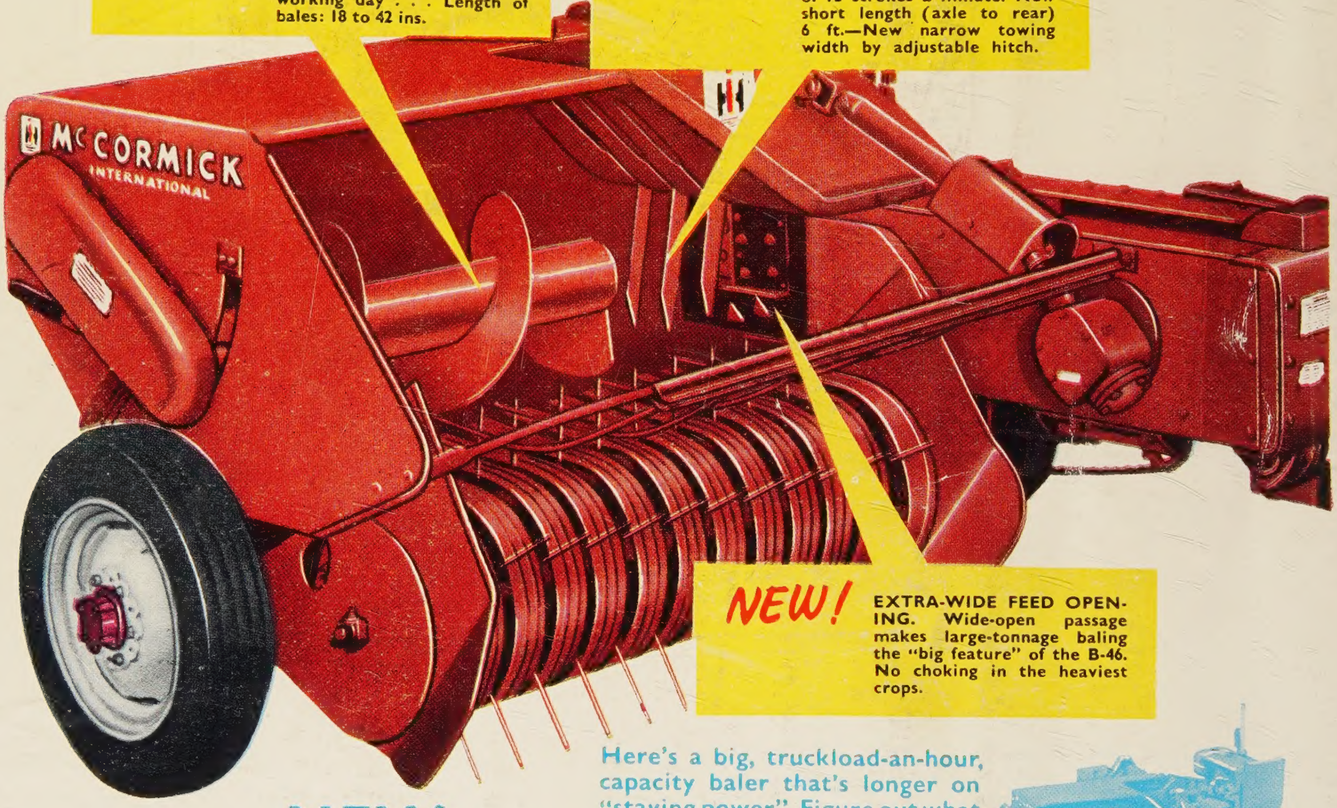

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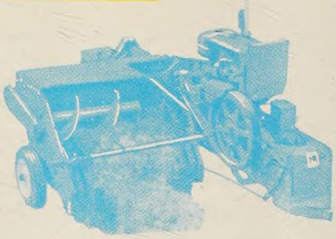

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